Subterranea

The Magazine for Subterranea Britannica

Subterranea Britannica **August 2023 Issue 63**

IN THIS ISSUE

Sub Brit visit to Windsor Castle
Leipzig Stasi museum
Jutland study tour
Norwegian Guns and WWII Bunkers

Subterranea Britannica is a society devoted to the study of man-made and man-used underground structures and the archaeology of the Cold War. The society is open to all and its membership includes all walks of life.
Members are invited to contribute to this magazine even if this just means sending very welcome snippets from newspapers and magazines.
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Front cover photo: *Human-powered ventilation plant is found in all Stasi bunkers. When the bunker at Machern near Leipzig was hermetically sealed, the last part of the ventilation corridor could be closed and fresh air circulated through the building by a ventilation system. In the event of a power failure, they could switch from the main fan system to the emergency system, which needed less energy, or if all power was lost, even to an exercise bike, which was run by human power. Twelve to 15 volts was enough to operate a small ventilation wheel to let air circulate in the building. Similar human-powered ventilation was used in British bunkers in WWII and during the Cold War. Photo Nick Catford*

Back page upper: *The Danish warship Niels Juel, was seized by the Germans in 1943 after she came under fire and the captain ran her aground. In spring 1944 a 15cm gun taken from the ship was mounted in an emplacement at the Bangsbo coastal fort on the southern outskirts of Frederikshavn replacing a Danish 12cm coastal gun. The Sub Brit party pose for the camera in front of the emplacement. Photo Dave Maguire*

Back page lower: *This year's National Association of Mining History Organisations (NAMHO) Conference, organised by Cumbria Amenity Trust Mining History Society (CATMHS), was based in Grasmere in the heart of the Lake District. A report, with descriptions of some of the mine visits, will appear in Subterranea 64. Here, our Chairman is seen in Coniston Horizontal Levels photographing a section of Deep Level, constructed by the renowned mining entrepreneur John Taylor who reopened the mines in 1824. A 100hp waterwheel pumped water up the Old Engine Shaft to Deep Level, enabling it to drain the entire workings, as well serving as the tramming level for bringing out all the mine's ore to the Bonsor Dressing Floors. Photo: Mark Hatton*

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Chairman's Welcome

Tim Wellburn

As the last issue of *Subterranea* went to press, three dozen of our members were heading off on this year's Sub Brit European Study Weekend to North Jutland. An eclectic range of locations had been selected and organised for us by Lars Hansson, ranging from the Danish Government's enormous Regan Vest bunker and local civil defence bunkers, to WWII German 38cm gun batteries, sea-washed Regelbau, and even an artistic underground limestone quarry (with a Cold War museum!). Our sincere thanks are due to Lars for delivering another splendid tour and, as usual, to Tony Radstone and Linda Dixon for organising the hotel, restaurant and transport logistics which necessarily underpin such expeditions.

Phil Catling then took the underground lead in arranging a much acclaimed Liverpool Weekend. He followed this with a real coup in securing Sub Brit a rare - and unexpected - visit to the Rhydymwyn Valley Works and Tunnels. Constructed from late 1939 for the storage and production of mustard gas, in 1942 work was commenced in Building P6 on uranium enrichment through gaseous diffusion, as part of the atomic bomb project.

Access to the Rhydymwn tunnels was possible for a number of years, thanks in part to a Sub Brit grant for safety equipment. Recent regulatory and other local complications had subsequently prevented access and we had almost given up hope of negotiating a further visit to this once-lethal site. Phil's success managed to offset, to some extent, the disappointment of 'the one that got away' when our visit to Warren Row, secured and arranged by Martin Dixon, was pulled at short notice by the site owner.

In the course of researching Warren Row, Martin had been surprised to discover that this iconic site, a former chalk mine later used as a wartime aircraft parts factory and – more notably – as a Regional Seat of Government (RSG), has no statutory protection. Perhaps its most famous day occurred 60 years ago when the self-styled 'Spies for Peace' exposed it as RSG.6, and it was subsequently invaded by thousands of CND protestors en route to Aldermaston.

As well as its significant historical role, the site is of considerable architectural interest: a two-storey structure installed within a former mine, in one location incorporating a 'Stanton' air-raid shelter as the upper floor. Large amounts of Warren Row's structure survives, including features such as the emergency exit, cable shaft, sewage pump, and map room.

These features are potentially at risk at the commercial whim of the wine storage company which now occupies the site. On behalf of Subterranea Britannica, Martin is therefore seeking protective listing by Historic England. Historic England chose not to grant this for Paddock, on the grounds that it was barely used and that surface features have been lost. Let us hope that they do not apply the same logic to Warren Row just because the Cold War (narrowly) avoided turning hot.

chairman@subbrit.org.uk

On Easter Sunday 1963
the Spies For Peace attempt to
enter RSG6 at Warren Row

SUBTERRANEA BRITANNICA DIARY

Summary of Forthcoming Events

2023/2024

Sub Brit specific events

26 August Brecon ROC Post Open (*as part of Libanus Show*)

9-16 September Polish trip with CDSG and FSG (*fully booked*)

17 September (tbc) Derbyshire, Alderley Edge, Wood Mine, Engine Vein

1 November Copy deadline for *Subterranea* 64

End-December *Subterranea* 64 published

12 April Sub Brit 50th Anniversary Event and meal (tbc)

13 April 2024 Spring Meeting & AGM

26-29 April 2024 Germany Trip

Autumn 2024 SB SWE Anglesey and Great Orme (tbc)

Other trips are in the pipeline, but not firmed up yet

Other Underground related events

9 September Reigate Caves Open Day www.Reigatecaves.org.uk

September 2023 Hidden Earth Association (BCRA) annual caving conference
Dates and venue to be confirmed

For up to date information about these events
please visit www.subbrit.org.uk/events
or contact the organisation concerned

If you know of other relevant events run by other societies, please let us know so that they can be advertised in the next edition and on the website

NEWS

Miscellany compiled by Nick Catford

NEWS – ARCHAEOLOGY

Remains of 19th-century prison found in city cave system, Nottingham

Substantial remains of the 19th-century Nottingham Borough Prison have been uncovered by archaeologists excavating a cave as part of preparation work to build a student accommodation block.

A huge number of caves are built into the underbelly of the city, including in areas such as Peel Street (visited by Sub Brit during Nottingham study weekend), where one system was used as a sand mine and later an air-raid shelter. Others sit under significant sites such as Nottingham Castle, which is home to 'Mortimer's Hole', a medieval tunnel used by King Edward III to capture his mother Queen Isabella and her lover, Roger Mortimer.

On a section of land in King Edward Street and Kent Street, where Nottingham's Central Market was hosted for more than 40 years after 1928, developer Fusion Nottingham Devco Limited was given the green light to build a 552-bed block for students and 89 residential apartments.

Little was known about the 200-year old cave system and a full survey has now taken place to learn more about it. City archaeologist Scott Lomax revealed that substantial remains of the former prison have now been found. Excavation uncovered remains of walls of the former Nottingham Prison, built in the 19th century.

Close to one of these walls was a shaft extending down into the cave. Unfortunately, that shaft was filled in 1928 and it is not possible to remove the material in order to gain access due to the nature of the filling and the significant depths involved. The cave is in excess of 10m below ground level, so it cannot safely be excavated and entered.

Scott Lomax has been working with the developer to ensure that the cave is fully preserved. The foundations of the new building will be constructed in such a way that there is no impact whatsoever on the cave. The precise location of the cave has been established through the use of deep probes which have been drilled to depths of 12m below ground level. This enables the foundation design to be modified to safeguard the cave.

Before it was used for the market, the area above the cave system was home to a hospital dedicated to St John the Baptist. This went on to become the House of Correction in 1610, which served the purpose of putting the destitute to work as part of a new law imposed during the Elizabethan period.

In around 1806 a new wing was built to improve the accommodation and poor conditions, and in later years it was renamed as the Nottingham Borough Prison. Public executions were moved to the site and took place until around 1864, when they ceased entirely, but private execution events continued thereafter. By the late 1800s it was considered the site was no longer fit for purpose and the Bagthorpe Gaol was established in Perry Road, Sherwood, in 1890, which is today home to the contemporary HM Prison Nottingham.

Those being held at the Nottingham Borough Prison at the time were transferred to Bagthorpe Gaol. The correctional facility therefore fell into disrepair and it was largely demolished after 1900 to make way for a new road in the form of King Edward Street, as well as the *Palais de Danse* dance hall, which is now home to the *Pryzm* nightclub.

Most recently the parcel of land above the cave system was occupied by office buildings, built in 1985. These have already been demolished as part of the new student block development. Mr Lomax said: "It is unfortunate the cave could not be accessed during the investigations, and every effort was made to obtain access. However, given the very significant depths, the material filling the cave, and the stability of the shaft, this was not possible."

SOURCE: *West Bridgeford Wire,* 5 July 2023

Mysterious labyrinth found hidden under a church in Mexico

Archaeologists working at the Mitla site in southern Mexico have come across a discovery worthy of an Indiana Jones movie: a labyrinth of chambers and passageways hidden below a church, representing an 'entrance' to the underworld.

When the buildings were put up by the ancient Zapotecs more than 1,000 years ago, they would've been used as a religious temple and known as the Lyobaa – the 'place of rest'. Several tombs appear to be part of the underground network, which sits some 16-26 feet below the surface.

To find the underground structures, researchers used three scanning methods to reveal what was hidden from view: ground-penetrating radar (measuring electromagnetic

wave reflections), electrical resistivity tomography (measuring the progress of electric currents), and seismic noise tomography (measuring the progress of seismic waves).

Combining the data from these techniques, the team produced a comprehensive map of what lies below ground. Today, there's a church on the site, built after missionaries arrived in the area; the altar of the church conceals the entrance to the underground network that's now been mapped.

The Lyobaa is beneath this church

It was the missionaries who documented and sealed off the Lyobaa. Writings from 1674 by Dominican father Francisco de Burgoa describe an underground temple in the spot, including four sprawling, interconnected chambers and multiple caverns and alleys deep below ground.

Now, it seems this place of rest has been found again. The Zapotecs were strong believers in the underworld, worshipped multiple gods, and emphasized rituals – including when someone died. The temple would have been in use until the late 15th century, it's thought, at which point the Aztecs and then the Spanish would have taken charge of the region. Thanks to the latest 3D imaging techniques, the network can be revealed again.

SOURCE: *Science Alert,* 17 July 2023

Rare clay figurine found in Lazio dating back 7,000 years

A press release from the Sapienza University in Rome has announced the discovery of a figure with female features in the Grotta di Battifratta, near Poggio Nativo in the Sabina area, Lazio. The cave is the subject of a study coordinated by the Department of Ancient World Studies of Sapienza University of Rome and the figurine was discovered during the latest excavation campaign.

The clay figurine has been dated to around 7,000 years ago, i.e. from the Neolithic period, when the first farming communities inhabited the peninsula. Objects of this type are scarce in Italy and almost absent in the Tyrrhenian regions. The technological and stylistic aspects of the statuette are being examined in order to find out how it was made and whether it reflects iconographic models that can be traced back to distinct cultural traditions. Facial features are outlined schematically, but greater care was taken in depicting the hairstyle and body decorations.

The cave of Battifratta opens on a travertine ridge along the valley of a small tributary of the river Farfa. The present entrance to the cave corresponds to the outlet of an ancient spring, probably seasonal, which was a point of attraction for human communities in the past. The presence of pottery, lithic industry, faunal and botanical artefacts on several stratified levels reveals the use of the spring and the cave not only for water supply but also for burial and ritual purposes, as evidenced by the human skeletal remains found and the clay figurine.

SOURCE: *Press Release,* Sapienza Universita Di Roma, 7 May 2023

New kind of Neolithic Age human burial ritual found in Spanish cave

All societies, ancient and modern, lay a great deal of emphasis on how their dead should be buried. In a cave in southern Spain, researchers have discovered the extent to which Middle-Neolithic-age societies (4800 BC to 4000 BC) practised burials and associated rituals, and the findings are far from pretty.

Two Neolithic age skulls were laid to rest, between 6,550 and 6,800 years ago, with a young sheep or goat, in one of the Dehesilla caves, Locus 2, south of Cadiz. One of the skulls was that of a woman, aged between 24 to 40 years, who was trephined (a hole was drilled into her skull) while still alive, and then decapitated. Her skull showed signs of healing indicating that the trephination probably occurred with some kind of surgery which wasn't successful, so she was decapitated.

Another skull was that of an adult man, most definitely older, and possibly of a higher social standing. The remains of a juvenile goat or sheep, and various tools, beautifully decorated ceramic vessels, lithic stone objects, charred plant remains and carved bones were found suggesting funeral rituals hitherto unknown from the Middle Neolithic age (one of history's most poorly understood periods). The skulls were laid to rest within 20cm of each other, both facing west.

A small wall separated them and the goat from a stone altar with a stele (a stone slab) and a hearth. The cave's stone platform and alcove formed a ramiform cave. Ramiform caves form as irregular

large rooms, galleries, and passages. These randomized three-dimensional rooms form from a rising water table that erodes the carbonate rock with hydrogen sulphide enriched water.

Research was carried out over a period of five years by a diverse team of scholars, historians and archaeologists from the Department of Prehistory and Archaeology of the University of Seville.

SOURCE: Plus One

Oldest Neanderthal engravings found in France

Strange markings hidden in a French cave for up to 75,000 years have been identified as the oldest known engravings made by Neanderthals. The marks, known as finger flutings, could provide key information about artistic expression in the ancient human relative, experts say. A team from the University of Tours analyzed marks found on a wall in La Roche-Cotard cave in the French region of Centre-Val de Loire.

These included long lines, dashes and dots found at several points throughout the cave.

They created 3D models of the markings to compare them with similar marks made by humans. Based on these engravings' shape, spacing and arrangement, the team concluded they were deliberate, organized and intentional shapes created by Neanderthal fingers drawing making indents on a soft surface. By analyzing sediment found at the site, they worked out that the cave had become closed off around 57,000 years ago as rocks and debris filled it up.

The team said this dates the 'finger fluting' to well before *Homo sapiens* became established in the region. This, combined with the fact that stone tools within the cave are associated with Neanderthals, is strong evidence that these engravings are the work of Neanderthals. By studying layers of rock, they said the engravings could have even been made as far back as 75,000 years ago. Since the engravings are not of an animal or object, the intent behind them is unclear but they are of a similar age to other cave engravings made by early humans in other parts of the world.

The team said their findings add to a growing body of evidence that the behaviour and activities of Neanderthals were similarly complex and diverse as those of our own ancestors.

SOURCE: *MailOnline,* 21 June 2023

NEWS – CONSERVATION AND HERITAGE

Plans launched to transform The Citadel in Dover into 'The Little City'

Ambitious plans to transform a historic fortress, Dover's Citadel, have been officially launched – with bosses planning to call it The Little City. Hotels, restaurants, art galleries, a visitor centre and music studios are all destined for The Citadel at the Western Heights, which will "breathe new life" into Dover. Made up of 54 buildings and covering 33 acres, the sprawling site will be turned into an "innovative hub" that will help "shape a brighter future" for the town. The design for the hotel is currently being worked on, with the team behind the project describing it as "one-of-a-kind".

The Citadel has an interesting history dating back to 1779 when early works started to fortify the hill due to American War of Independence. A plan dated 1784, by Engineer Officer Lieutenant Page, shows a bastion fortification across the Western Heights. This drawing is the earliest of its kind and represents what would then progress to form the Citadel.

Work on the Drop Redoubt also started at that time. With the threat from Napoleon in 1803, building work was massively ramped up. The earlier works at the site were bricked in and the casemates were constructed. The same approach was taken at the Drop Redoubt – which due to sheer hard graft, was finished in 3-4 years, along with the Grand Shaft, Grand Shaft Barracks and the Hospital.

The commencement of the Battle of Waterloo in 1815 meant that the Citadel, as it stood, was then abandoned uncompleted. Meanwhile the Grand Shaft Barracks were fully manned. In 1840 minor construction works continued at the Citadel, albeit at a slow pace.

With the threat of Napoleon III in 1860 work resumed in the Citadel and the Officers' Mess was constructed. The Western Outworks were also constructed to give extra barracks accommodation. In 1861 the first infantry Battalion moved into the Citadel. The South Front

The Citadel

Barracks were also constructed. From this point on until 1944, the Citadel had an infantry garrison, no one regiment, but it was a posting point for all and sundry in the army. Most battalions stayed a year or two.

In 1910 work continued at the Citadel with lots of extra buildings being built. Between 1914-18 the 3rd East Kent Regiment (The Buffs) were training men for the front line. In 1940 works continued in the Citadel to install AA defences and the ditches were then mined. In 1944 the Citadel was empty and in 1950 the War Office offered the Citadel to Dover District Council, but they refused it due to lack of purpose and maintenance costs. Instead the Prison Service took on the fort and began converting it into a prison.

After 1955 the Citadel became a Young Offenders Borstal Prison. During this period members of *Subterranea Britannica* were able to visit the counterscarp galleries in the ditch and Nick Catford remembers being escorted through the prison by the governor past jeering inmates!

In 2000 Dover Immigration Removals Centre took over the Citadel. In 2015 the Ministry of Justice pulled out of the Citadel and closed the Immigration Removals Centre, amongst others. In 2020 TechFort took over ownership of the site and the huge renovation of the site started. The site will formally open as 'The Citadel' in 2023.

SOURCE: *KentOnline,* 30 May 2023 and *The Citadel* website

Tour of church crypt at Greenwich, South London

If you fancy an evening spent wandering the brick-lined vaults of the dead, then there's a chance this summer with tours of the crypt underneath St Alfege church in Greenwich town centre. The historic church was badly damaged during WWII, was restored, and has recently been restored again.

When the church was built, it was decided to include a large undercroft underneath. It was supposed to be similar in size to the one under St Martin-in-the-Fields, but either wasn't, or the base has since been filled in a bit raising the floor by a metre or so. The church instead decided to sell off plots of the crypt for burials, and people could either buy an entire vault or just a spot in the communal vault. Burials stopped a long time ago, and the vaults were bricked up and sealed.

The crypt was cleared out as part of the recent renovation works, and you can go through a small side door, down some steep stone steps, take a small torch, and stand in the corridors lined with the dead. It's well lit and dry, and the torches are only needed to highlight the memorials down here.

Photo Ian Mansfield

In a far corner, there are what's thought to be remnants of the older medieval church, where you can stop and listen to the funeral music that was played in the church above for the funeral of Thomas Tallis, which is quite an experience in itself to listen to, surrounded by the dead. A lot of the tour is pointing out the notable dead, and yes, you can peer into the crypts through iron railings, although the coffins are all covered over in soil to protect them and their dignity, so you are basically looking at empty chambers. The tours end with memories of a more modern use the crypt was put to – as an air-raid shelter during WWII.

Along with the church above and the crypt below, the tours last around an hour and should appeal to anyone keen on seeing the subterranean world beneath our feet. Tours take place either every other Saturday in the morning or on the first Wednesday in the evening.

They're also very affordable at just £6.84 per person, which is quite good value for an hour of fun. Tickets need to be booked in advance. St Alfege church is in the centre of Greenwich, a short walk from Cutty Sark station on the DLR, or Greenwich station for Southeastern trains.

SOURCE: *Ian Visits* website, 14 June 2023

St Nicholas Market and air-raid shelter tour, Bristol

In July Sub Brit member Adrian Armishaw went on a guided walking tour around the St Nicholas Market area of Bristol. The tour includes a visit to the large and well preserved public air-raid shelter beneath the former Corn Exchange building. The two-hour tour includes other sites of subterranean interest and some bomb-damaged buildings. It is led by Duncan McKellar who presents his thoroughly researched information in an entertaining and engaging style.

He is currently in talks with a view to possibly developing the shelter as a museum and attraction in its own right and was not previously aware of the existence of Sub Brit, a situation which has been remedied through the medium of a nearby pub. I strongly recommend the tour.

Photo Adrian Armishaw

The first half of your tour is spent discovering the historic alleyways of the old town and learning about the origins of the city. For the second half visitors head beneath the streets for Bristol's only subterranean experience! The city's biggest public air-raid shelter which has been left untouched since WWII.

SOURCE: Adrian Armishaw

Ringstead (Dorset) Chain Home bunker converted into luxury holiday home

An abandoned bunker that once warned of Hitler's bombers in the Second World War has been transformed into a quirky holiday home. The windowless concrete structure was built into the hillside at Ringstead Bay, Dorset, in 1941 and served as an RAF radar base.

It was part of the 'Chain Home' early-warning system of bunkers spread across the south coast used to track the German Luftwaffe. The fortification was later refurbished and used as a Rotor station to look out for Soviet bombers during the Cold War before being decommissioned in 1956.

Now the old bunker has been given a new lease of life as a holiday home, complete with a kitchen, two bedrooms and stunning view across Dorset's Jurassic Coast – and it's proved a hit with holidaymakers, who have booked it out for the summer. Camouflaged into the hillside, it sits on land owned by dairy farmer Johnnie Russell, whose family have owned the plot for more than 400 years.

The Grade II-listed fortification was almost completely hidden from view, just looking like a grassy mound from the outside. Mr Russell secured planning permission to convert it into a novelty holiday bolthole last year, which now features 'blast opening' patio doors that flood the once dank and dark space with light.

Known as the 'Transmitter Bunker', the unique holiday let sleeps up to four people in two bedrooms and prices start from £702 for two nights. It opened to holidaymakers in April through Sykes Cottages and is already fully booked for July, August and September.

The bunker has an open-plan living and dining room, kitchen, a twin bedroom, a bunk bedroom and a shower room. A far cry from its once spartan wartime facilities, the bunker now has underfloor heating, a smart TV, Wi-Fi and modern kitchen appliances including a dishwasher.

But while it has been transformed, nods have been paid to its previous life, with the concrete walls kept bare throughout and exposed pipes and lighting visible. Architect Jonathan Plant said they sought to celebrate the structure's historical significance. He said: 'It is essential for us to make sure that anybody staying at the bunker will be able to understand the building's history and original purpose.'

Work has already started on a second bunker on Mr Russell's land which is much bigger but will have a similar look and feel.

SOURCE: *MailOnline*, 11 May 2023

NEWS – HEALTH AND SAFETY

Thirteen die in flooded road tunnel in South Korea

Thirteen bodies were recovered from a tunnel in South Korea as the flooding death toll across the country rose to at least forty.

Cars were trapped in a tunnel underpass in Osong in the central, mountainous region of Cheongju, about 70 miles south of Seoul, when the Miho River burst its banks on 15 July following 48 hours of extreme rainfall which forcefully filled the busy underpass, stopping vehicles dead. The underpass was filled with 13 to 16 feet of water dense with mud and other debris. About 900 rescuers continued to search the tunnel, which fire officials estimated filled with water in as little as two or three minutes.

Rescuers approaching the flooded tunnel in Cheongju

Photos and video from the scene showed rescue workers pumping brown water out of the tunnel as divers used rubber boats to move in and out of the area. By Monday afternoon, rescuers had pumped out most of the water from the tunnel and were searching the site on foot a day after they used rubber boats to move and transport bodies on stretchers. Workers were proceeding slowly with the work to prevent any victims or survivors from being swept out.

South Korean President Yoon Suk Yeol has said he will "completely overhaul" the country's approach to extreme weather, as "these events will become more commonplace. We must accept climate change is happening, and deal with it."

SOURCE: *BBC News,* 17 July 2023

Inquest opens into Kong Adventure death in Cumbria

An inquest has opened into the death of Carl O'Keeffe who died after getting stuck in an indoor cave at Kong Adventure in Keswick, Cumbria. Mr O'Keeffe was trapped in an artificial cave passage on 22 April for hours before being rescued by volunteers from Cumbria Ore Mines Rescue Unit, Keswick Mountain Rescue Team and firefighters. He sadly passed away in Cumberland Infirmary, Carlisle, ten days after being freed.

During the rescue the climbing wall staff, assisted by visiting climbers, started dismantling sections of the wall to aid access to the 70m long cave system hidden behind the climbing wall panels. Carl's case was opened by the Cumbria coroner in Cockermouth with a full inquest to be held on a future date.

SOURCE: *BBC News,* 16 May 2023

Body found in caves in Auckland, New Zealand

A body has been found in Abbey Caves, New Zealand, where a teenager went missing during a school trip on 9 May. The boy was among a group of 17 from Whangarei Boys' High School who went into the caves, despite widespread flooding in the Auckland region. The group was initially trapped but 14 students and two teachers made it out safely. The boy, Karnin Petera, aged l5, was unaccounted for.

The Abbey Caves are a series of three caves on the upper North Island which features limestone outcrops and sink

Abbey Caves

holes. The cave system is prone to flash flooding. The incident has raised questions about why the school trip went ahead even after weather forecasts warned of heavy rains. Auckland, New Zealand's largest city, had declared a state of emergency after heavy rainfall stranded cars, uprooted trees and disrupted public transport.

SOURCE: *BBC News*, 10 May 2023

Peruvian gold mine fire kills 27

At least 27 people have died in a gold mine fire in Peru on 7 May, in the worst mining accident in the country in decades. Two people were rescued from the blaze, but no more survivors were found. An electrical short-circuit is thought to have sparked the fire inside the La Esperanza mine in the Arequipa region. Some 30 specialist officers headed to the scene to secure the mine itself before beginning recovery efforts.

It is believed that miners were working at least 80 to 100 metres below the surface when the blaze broke out and quickly engulfed one of the tunnels. The closest police station was some 90 minutes away from the remote site, and several hours from the closest city, complicating the emergency response. The mining company itself – a small operation named Yanaquihua – is a legal enterprise that has been operating mines in Peru for 23 years, but there are many illegal mines in the region. The bodies of all 27 workers killed in the fire have been recovered.

Peru is one of the world's largest gold producers, mining more than 100 tonnes a year – about four percent of the entire world's annual supply – and the industry accounts for more than eight percent of Peru's gross domestic product. While the fire is believed to be the worst disaster

in years, dozens of deaths a year are not uncommon in the country's mining industry – usually spread over many smaller incidents.

SOURCE: *BBC News,* 7 May 2023

Fatal potash mine accident in Suria, Spain

Just before 9am on 9 March three geologists from the Iberpotash company were killed by a roof fall in the Cabanasses potash mine, Suria, northwest of Barcelona in Catalonia. Two of the casualties were students at the Escola Politecnica Superior d'Enginyeria de Manresa (EPSEM), a branch of the Universitat Politecnica de Catalunya, where they were studying a master's degree in geology.

The collapse occurred at the 900m level in a recently driven tunnel. To reach the site, rescue workers went down in the cage to the 700m level, and then had to walk down an incline to reach the new tunnel. It took them about eight hours to stabilise the workings and recover the three geologists. It has been ten years since a fatality occurred in this mine. Two miners died on December 6, 2013 while doing maintenance on an extraction machine.

Potassium salts have been mined in the Suria area since 1185, mainly as surface workings. In l9l3 the first surveys were carried out to see if the salt deposits could be exploited at depth. The first shaft was sunk in 1918 and the salt processing factory and the railway were built. The company Iberpotash (part of ICL Iberia) currently has two mines and treatment plants in Suria and Sallent/Balsareny.

A general view of the potassium mine

The major development (since 2018) at the site is the Cabanasses Mine ramp project. This project is the longest mining tunnel in Spain. It is a ramp with a length of five kilometres reaching a depth of 900m. It is designed to allow the direct movement of salt and potash from inside the mine to the treatment plant, without having to transport the mineral through the town of Suria as it is being done today.

Construction is being carried out using the New Austrian Tunnel Construction Method and using shotcrete to support the tunnel. The Cabanasses Mine ramp project represents a technical challenge, given the operating conditions and the characteristics of the tunnel (length, depth, and slope). This together with the salinity conditions and the mechanical requirements for the depth reached puts high demands on the materials used.

SOURCE: *La Vanguardia,* 9 March 2023

NEWS – MILITARY AND DEFENCE

Chinese peacekeepers to Mali complete bunker with wooden roof!

The 10th Chinese Peacekeeping Combined Construction Engineering Company to the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) completed the air defence bunker reconstruction mission for the Egyptian police contingent in MINUSMA Sector East on 12 July.

The wooden top of the air defence bunkers had deteriorated due to years of erosion from wind and sand, not able to provide protection. Reconstruction of the air defence bunkers was in urgent need. According to the requirements of the mission, the Chinese engineering contingent dismantled the original bunkers and rebuilt steel double-deck container bunkers with stronger defensive capabilities.

The newly-built bunkers consist of containers and sandboxes, which required several steps in sequence, including container hoisting and stacking, top steel plate welding, sandbag filling, and container stacking. Most of the work was done manually due to the narrow working space. Over 2,500 sandbags were laid throughout the reconstruction process, and the mission was successfully accomplished within only 20 days.

SOURCE: *China Military Online,* 14 July 2023

Brislington regional war room to be refurbished for business or commercial use

Plans to transform a former Government building in Bristol into new homes and offices have been given the green light.

Property firm Telereal Trillium in conjunction with Bellway Homes was granted planning permission by the city council to redevelop the old Department for Work and Pensions offices and driving test centre in Brislington into a new mixed neighbourhood. The site on Flowers Hill, which was vacated in early 2021, will include 160 new homes including affordable housing, a children's play area and open green spaces.

The two-level operations room. This is the only Regional War Room operations room surviving in original condition. Photo Nick Catford

The site also includes a former nuclear bunker known as Bristol War Room, which has been abandoned for a number of years. Built in 1953, underneath the Grade II listed building, it was designed to withstand an atomic bomb. According to Telereal Trillium, the approval will allow the War Room to be reused for commercial business or community use, while preserving its historical interest.

The developers are also planning to build a pedestrian and cycle link between Flowers Hill and Hungerford Road and make a financial contribution to public transport improvements, including funds for the construction of an outbound bus lane on the A4 Bath Road.

SOURCE: *Business Live,* 21 March 2023

German archaeologists find 'well preserved' bar in old WWII bunker

German archaeologists have found a "very well preserved" bar hidden in an abandoned World War II bunker that once sheltered hundreds of people at a time. The bunker, in the city of Dortmund, West Germany, was built in 1940-41 by citizens for use as an underground shelter during air raids.

It was one of many air-raid shelters that existed in the city of Dortmund at that time; some of them are still preserved. The bunker measures around 19 feet by 140 feet and had enough space to shelter up to about 390 people inside during the war. The city of Dortmund was almost completely destroyed during World War II.

In the years following the surrender of Germany, the people of Dortmund were busy with rebuilding their homes and the city's infrastructure. Eventually, cafés, pubs and restaurants reopened. The authorities in Dortmund, however, supported many a 'creative' or uncommon business idea in order to accelerate overall reconstruction.

In this context, the original owners of the unusual underground bar received an operating license in late 1949 and began trading. This state of affairs continued until 1971, when their license was not extended due to legal changes. By this point, the city had been rebuilt, negating the need for such spaces.

In 1981, unknown intruders started a fire in the bunker. In the aftermath, local authorities took the decision to lock the bunker to protect the historic site from vandalism. For that reason, its exact location has been kept a secret to this day. For decades, the site remained untouched. That is until this year, when a team of city archaeologists were given access to the site for two days.

First, the concrete slab placed in front of the entrance to block it had to be lifted with a crane. When the archaeologists finally entered they found several rooms, with many bottles, kitchen utensils and broken pieces of furniture on the floor. They even found several menus. It quickly became clear to the team that the bunker had still been in use after the war.

At the time, it appears that the establishment was referred to as 'Zur Grotte,' or at the grotto. Among the items on the menu were beer, as well as ice cream sundaes, preferably served with pineapple or other canned fruits. After allowing the archaeologists to explore the bunker, the city then sealed the entrance again with concrete at the end of April.

SOURCE: *Newsweek,* 24 May 2023

MOD build underground training base on Salisbury Plain

Military commanders are building a huge multi-million pound training complex to prepare British troops for fighting underground, after studying the Russian siege of the Azov steel plant in Ukraine. Defence sources said the need to train for subterranean warfare was highlighted by the battle in Mariupol, where thousands of Ukrainian troops held out for weeks in a warren of tunnels against Vladimir Putin's invading troops.

The new £5m training base will be built near an existing Army training village called Copehill Down on Salisbury Plain. Tunnels will be several miles long and in places be just wide enough for fully equipped soldiers to move along in single file.

An Army source said: "We want to train soldiers in the most arduous conditions available. This new network of

Ukrainian shelter beneath the Azov steel plant

tunnels will be dark, hot and very claustrophobic. This is the nature of modern warfare – look at what has been happening in places like Mariupol in Russia, as well as Syria and Afghanistan. Lots of tunnel fighting. The British Army needs to be prepared for that sort of combat. It's not the sort of skill you want to learn on the job." Tunnel or subterranean combat in an urban environment is one of the most demanding of all forms of warfare.

SOURCE: *Daily Mail,* 23 July 2023

Honingham ROC Post, Norfolk for sale

Over the last twenty years many ROC posts have come on the market, some for the second or third time. In 2003 I was employed for two weeks by Crown Castle Communications to travel around the country opening up 55 ROC posts that were surplus to requirements.

The bunkers were originally bought by Millennium Communications after ROC stand-down in 1991. Millennium bought several hundred posts from the Home Office with the intention of putting cellphone masts on the sites. Some sites did get a cellphone mast but at many, planning permission was refused.

In 1998 Crown Castle who are based in Houston, Texas acquired Millennium Communications (a British company) and they soon found that 55 ROC posts came as part of the deal. Having surfed the net and found my name on the Sub Brit website, they gave me the job of opening them up ready for sale. This involved cutting off all the padlocks and fitting cheap combination locks.

Photo Nick Catford

I was given a large box of keys but no indication of which post they were for so cutting the locks off was the only option. The posts were offered for sale on eBay and Sub Brit members ran public open days at all the posts. Most of the posts were sold with prices ranging from £4,000 to £30,000.

Strangely the best preserved posts at a nice location did not always get the highest price. Some of the worst condition posts sold for in excess of £20.000. All posts were sold with a ten-year claw back clause which meant the new owner had to pay Crown Castle a percentage of any profit if the bunker was sold on within ten years.

Many bunkers have come back on the market, most being offered for sale by local estate agents. In June 2023 the Honingham ROC Post in Norfolk was offered for sale by property firm Arnolds Keys who described it online: "The atmospheric underground relic in Barnham Broom, between Norwich and Dereham, has hit the market with a guide price of £25,000.

It was used as a Royal Observer Corps monitoring post between 1962 and 1991, during the prolonged period of postwar tension between the Soviet Union and the USA, along with its allies. Situated in a small area of grassland, the tiny two-room bunker, complete with rudimentary toilet, lies beneath a raised manhole lid above a metal staircase, while an air vent leads to a second ground-level outlet."

Offers were invited until 3 July. Arnolds Keys have not revealed the final selling price but they told me it was "comfortably in excess of the Guide." They added "the main limiting factor for this bunker was the lack of surrounding land and also the view is set to be lost due to a solar farm being constructed on the surrounding farmland."

SOURCE: Nick Catford

WWII Japanese horror bunker discovered

Chinese archaeologists have discovered an underground "horror bunker" used by Japanese scientists to conduct brutal experiments on humans before and during World War II. The facility near the city of Anda, China, is believed to have been used by Unit 731 of the Japanese Imperial Army, which conducted brutal experiments on humans between 1935 and 1945.

Japanese scientists exposed prisoners to pathogens and dissected them to learn about the effects on the human body. The findings were used by Japan's Imperial Army to spread typhoid, cholera, and plague across China. The notorious unit experimented on and killed thousands of people, including men, women, and children.

The research published in the journal *Northern Cultural Relics* in May could provide new evidence about war crimes. It also highlights the ongoing legacy of Unit 731's atrocities and their impact on global efforts to prevent biological warfare.

Archaeologists discovered the underground facility consisting of several interconnected tunnels and chambers

The ruins of a Japanese germ warfare centre located in Harbin, northeast China in 2005. At least 3,000 people, including Chinese civilians, Russians, Mongolians and Koreans, were killed in tests of biological weapons and other experiments by Unit 731 between 1939 and 1945

after starting an investigation in 2019 using geophysical prospecting, drilling, and excavation techniques. The researchers are yet to enter the bunkers, but the survey has revealed details about the underground structures. A U-shaped cluster of bunkers was discovered five feet below the surface, as well as a circular room that archaeologists believe was used to observe and dissect human subjects after they were infected with pathogens or chemical agents.

Researchers said that their knowledge of the underground facility is still preliminary, and more work will need to be done to learn how the structures relate to each other. Most of the surface-level buildings at the Anda site were destroyed in 1945 to erase evidence of the experiments, but the underground structures remain. Facilities were built below the ground to maintain secrecy, and these included barracks, bathhouses and dining areas.

Some Unit 731 researchers were arrested by Soviet forces and tried at the December 1949 Khabarovsk war crime trials, while those captured by the United States were granted immunity in exchange for their research findings.

SOURCE: *Business Insider – Africa*

NEWS – MINES AND MINING

Tests begin to find undersea site to store radioactive nuclear waste

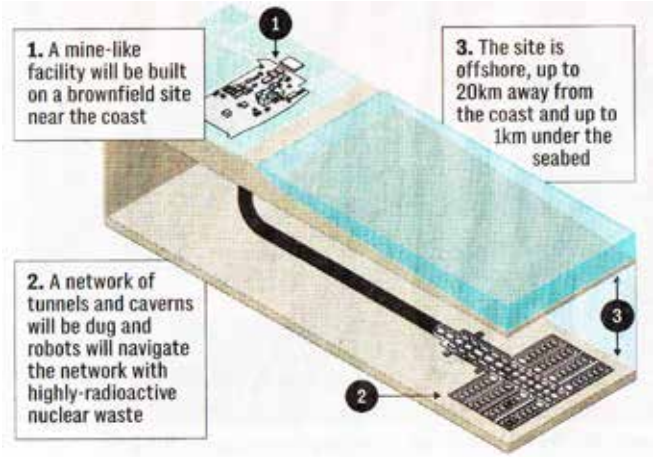
The first tests are under way to determine where Britain will store its highly radioactive nuclear waste, *The Daily Telegraph* can reveal. Work has begun to see which of four locations are best suited to house the UK's first geological disposal facility (GDF) where millions of tons of nuclear waste will be permanently stored under the sea.

Currently, four sites are in the running to host a GDF and are receiving £1 million a year for community projects as a result. Three are in Cumbria and one in Lincolnshire.

Britain has already accrued around 700,000 cubic metres of nuclear waste over the last 70 years. This is currently stored above ground, primarily at Sellafield. But the long-term plan is for all waste to be buried deep underground. It is hoped that the UK will have a GDF in operation by the 2050s.

This is the first analysis on the sites themselves and will involve analysing seismic data as well as poring over troves of existing analysis. No invasive work will begin until the shortlist of sites is cut to two locations, when boreholing will commence. Nuclear Waste Services (NWS), part of the Government's Nuclear Decommissioning Authority, is leading the work to find and build the UK's GDF.

The site itself will involve a mine-like above-ground site near the coast and a series of tunnels to transport and store the waste 1,000 metres under the seabed and up to 12.5 miles off the coast. It is estimated to take 15 years before a site is selected and another 15 years for the endeavour to be completed. It will then be operational for more than a century, with experts predicting the GDF to be closed around 2170.


1. A mine-like facility will be built on a brownfield site near the coast
3. The site is offshore, up to 20km away from the coast and up to 1km under the seabed
2. A network of tunnels and caverns will be dug and robots will navigate the network with highly-radioactive nuclear waste
1
2
3

The unprecedented engineering project involves excavating an area under the sea that is three times bigger than Heathrow Airport. This labyrinth will be filled with nuclear waste and then sealed and closed for eternity. Prof Neil Hyatt, the chief scientific adviser at NWS, told *The Telegraph*: "We're beginning to take a deeper look into the feasibility of developing a GDF in each of these four communities. Before we get to the point of boreholes we need to do some more fact-gathering, strategising, plan development and that kind of thing."

Speaking to *The Telegraph*, the University of Sheffield's Prof Claire Corkhill, a member of the Government's committee on radioactive waste management, said: "The truth is that at Sellafield, you're running out of space to build stores and it's almost at the point now where it's slowing down the progress of decommissioning. The GDF is really needed."

A Department for Energy Security and Net Zero spokesman told *The Telegraph* that a GDF is "essential" to the Government's nuclear policy and the search for a site "is taking local geology and consent of the local community into consideration."

SOURCE: *Daily Telegraph,* 28 June 2023

UK lithium mining announced in Cornwall

The mining of battery-grade lithium carbonate – a key component in electric cars – has been announced in Cornwall. The joint venture between china clay company Imerys and British Lithium aims to operate the UK's "leading lithium hub" within five years. Their target is to supply 500,000 electric cars with the component per year by the end of the decade.

The development, in the St Austell area, could potentially create at least 300 direct jobs, the companies said. It is estimated there are enough resources that the life of a mine could exceed 30 years and produce 20,000 tonnes of lithium carbonate equivalent per year. This would meet roughly two-thirds of Britain's estimated battery demand by 2030.

Work started on the project in Cornwall in 2017

The UK government has previously acknowledged the urgent need for electric vehicle battery manufacturing in the UK to secure the future of the car industry. A spokesperson for the new Cornwall project said drilling and exploration had been carried out since 2017 and a process and pilot plant had been developed. It has received financial support from Innovate UK and the Automotive Transformation Fund, a program to support the electrification of vehicles and their supply chains in the UK.

Lithium carbonate comes from granite. The company are taking the crushed material which is put through a series of mechanical processes which is sieving, and that creates a concentrate. The concentrate is mixed with other materials to create a pellet form, which is then roasted at a very, very high temperature. That creates and extracts the lithium and puts it into a water-soluble form which is then able to be refined ready to go to battery manufacturers.

SOURCE: *BBC News,* 29 June 2023

Mining Collapse in Redruth

Two properties were evacuated after part of a garden fell into disused mine workings on the outskirts of Redruth, Cornwall, creating a 2m wide hole. The residents made their own arrangements to leave their homes and the Council advised them to contact their insurers and appropriate mining engineers for advice.

Several homes lost electricity when the collapse happened on 19 March and Western Power Distribution brought in a generator to provide supplies, before the supply was routed via a newly installed power pole. Two weeks after the collapse a mining consultant warned that the hole could get larger as ground movement is "still ongoing". The shaft above the disused mine workings had already increased in size since it was first reported on 19 March.

The collapse occurred at a known shaft on the site of a former engine house that was once part of Wheal Trefusis copper and tin mine. Wheal Trefusis was about three-quarters of a mile southeast of Redruth railway station off South Downs road. The sett also included East Wheal Trefusis and was bounded by Clijah and Wentworth Mine to the west and Wheal Spamon to the north. Wheal Trefusis raised 350 tons of 6.5% copper ore and 205 tons of black tin 1853-63. The mine closed in 1865.

SOURCE: *Below* – journal of the Shropshire Caving and Mining Club, Summer 2023

Ochre pollutes Whitehaven Harbour, Cumbria

Ochrous water started entering Whitehaven Harbour from a culvert in Queens Dock at the end of last year. Initial results from the Environment Agency, which took samples from Queens Dock in December 2022 and February 2023, showed "increased metals in the water". Despite the Whitehaven area once being a major coal mining area, renowned for its gassy and fiery pits, the actual source of the ochre is unknown.

The brown water in Whitehaven harbour

Network Rail have commissioned a hydrogeological surrey of a railway tunnel on the Cumbrian Coast line and its immediate surrounding area. This work has been described as "complex". Although the tunnel that runs under the town is not the source of the water, it is hoped more knowledge could identify the source and help prevent polluted water reaching the harbour.

The survey will see an independent specialist carry out surveys to build up a 3D picture of how the area's topography, infrastructure, historic mining features and geology interact with both surface and groundwater in the area. Network Rail is one of several organisations which also includes the Environment Agency, Coal Authority and Copeland Borough Council who have been working with Whitehaven Harbour Commissioners to find out the source of the discoloured water.

The Whitehaven Harbour Commissioners hope that once the source of the water is identified it could then be either diverted or prevented from entering the harbour, allowing the colour of the water to return to normal.

SOURCE: *BBC News,* 14 April 2023

NEWS – MISCELLANEOUS

Guernsey man spent 80th birthday in German bunker he fitted out after WWII

A man who grew up in postwar Guernsey has spent his 80th birthday showing his family a piece of his past by re-exploring a bunker he secretly wired. When Keith Tostevin was aged 14 in 1957, he was instructed by the States of Guernsey to install electricity in a former German bunker – but he was told to keep it a secret.

Despite hearing that the bunker was being prepared to become a shelter for government officials in case of a nuclear bomb attack during the Cold War, Keith has never had this confirmed. Sixty-six years later, he has finally taken his family to Pleinmont to explore the fortification and to hear his story. The bunker has been largely untouched since the 1980s, and remains closed to the public.

However, Keith was granted special permission from *Festung Guernsey*, who hold the keys to bunkers across the island, to re-enter the historic building on his birthday. The former Douzenier describes the feeling of re-visiting his past as "wonderful". He said: "Just standing there, all the flashes came back of being a young lad."

SOURCE: *ITV News Guernsey,* 22 July 2023

Swedish cave Thermos plan

Swedish energy company Malarenergi has plans to turn vast caverns beneath the Swedish city of Västeras, that once held a stockpile of oil totalling 300,000 cubic metres, into an underground Thermos. During the Cold War oil was stored there in case World War Three broke out and Sweden found itself cut off from international energy supplies. In 1985, as geopolitical tensions began to ease, the caverns were emptied and have remained vacant – until now.

Malarenergi has embarked on a project to decontaminate the facility and fill it with hot water at temperatures of up to 95°C. This type of thermal storage is just one of several ways of caching warmth in the ground for use later. With the rise of renewables and concerns about energy security in Europe following Russia's invasion of Ukraine, some argue that we should be making more of below-ground heat storage systems. In the case of Västeras, warmth from the caverns will be sent via heat exchangers to a district heating network, which supplies 98 percent of the households in the city of 130,000 people.

They intend to start filling the caverns with water by the end of the year. The facility will offer 500MW of heating power. The company has a nearby power plant with furnaces for burning waste or biomass and turning it into electricity or thermal energy; this will be used to heat the water in the underground reservoir. It should allow Malarenergi to continue heating homes on cold winter days when demand is high, without reducing electricity production at the power plant.

One of the Swedish caverns due to be filled with hot water

Storing heat underground tends to work well because it is very hard for the heat to escape – the ground itself acts as one big insulator. It is believed that these caverns will retain heat for multiple weeks and the system ought to be particularly stable once a few years pass and the temperature of the adjacent ground rises.

This may chime with Londoners weary of sweaty journeys to and from work on the tube. For decades, heat from people and trains has been warming the clay that surrounds tunnels on the London Underground. So much so, that this clay now has an ambient temperature of between 20°C and 25°C, making it very difficult to cool down tube carriages and platforms on the network. Yet, when first built the Underground was sold to Londoners as a nice cool place to escape the heat of the city!

SOURCE: *BBC Business News*, April 2023

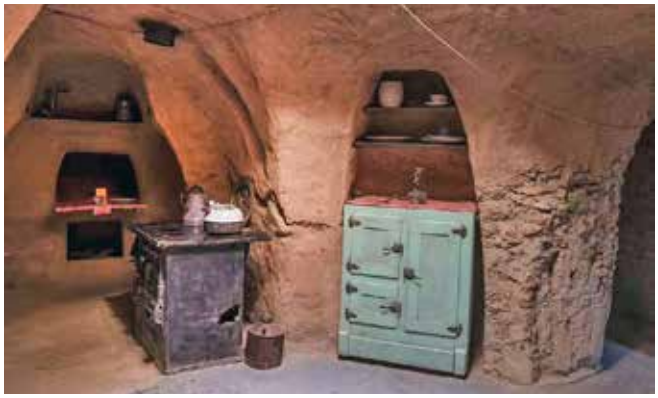
Hidden underground gardens in California

Lurking in the heart of California is a subterranean wonder that took one man 40 years to create by hand. The Forestiere Underground Gardens were tunnelled out in

the early 1900s by Sicilian immigrant and citrus farmer Baldassare Forestiere.

He spent decades creating rooms, courtyards and planting beds up to 20 feet below the surface with just a pick, a shovel and a wheelbarrow. By the time he was 44 years old, he had excavated and planted more than 10 acres. According to the attraction's website, Baldassare – who moved to America in 1901 – was inspired by the ancient catacombs he 'admired as a boy', near his home town of Filari, Sicily.

When he moved to Fresno he found it was impossible to grow citrus trees in the hard sedimentary rock, so he resorted to digging down instead. In 1923 the farmer told a newspaper reporter that he needed to ban visitors because he was socializing too much instead of dedicating his time to working on the gardens. Word spread about the masterpiece he was creating and visitors started descending on the site.



Baldassare would happily show people around and share his visions with them, but he started to realize the constant influx of visitors was hampering his progress. Thanks to his hard work, he was able to plant multiple varieties of fruit-bearing trees including kumquat, carob, quince, and dates along with vines. The fruits could easily be harvested from the surface of the gardens by simply bending down.

Some of the rooms in his underground complex include two bedrooms, a small chapel, a kitchen area with a free-standing stove, and a bathing area with a tub. There is also a living room three levels down with a glass ceiling that looks into a pond above, which Baldassare installed so that he could admire his fish from below. He even went about constructing a large tunnel so that guests could drive right into the gardens in their cars and vents in the tunnel allowed for any exhaust fumes to escape.

Today the Forestiere Underground Gardens remains a family-run operation. It is open to the public, with guided tours coming in at $23 per ticket.

SOURCE: *MailOnline,* 23 July 2023

Four London Underground phone kiosks given Grade II listing

Four rare phone boxes on London Underground stations have been given Grade II listed status by the government for their architectural and historic interest. The phone boxes are among 11,000 K8 kiosks that were installed across the UK between 1968 and 1983. Only about 50 remain, mostly in Hull where they were part of an independent phone network rather than the property of British Telecom.

The K8s on tube stations were owned by London Underground and housed an internal phone system for station staff. As such, they were painted different colours to the traditional red phone boxes. The newly listed boxes are at High Street Kensington and Chorleywood, both blue; Chalfont and Latimer, maroon; and Northwick Park, which is white.

Tom Foxall of Historic England, the body that recommends listing to the government, said: "There are very few designs that can be genuinely termed as 'iconic' but the K8 is certainly one of them. Like its predecessors, this kiosk was a defining feature of 20th-century Britain's physical, technological and cultural landscape. Very few K8s survive, so they certainly need to be cherished and protected."

The K8 was commissioned by the General Post Office, which owned the public phone network in the mid-60s, and designed by the architect Bruce Martin. Unlike the classic dome-topped K2 and K6 boxes, designed in the 1920s by Giles Gilbert Scott, which have architrave moulding and glass panelling, the K8 is minimalist with a flat roof and single large windows.

A blue K8 kiosk at Chorleywood station

Most of the 11,000 K8s were removed by British Telecom after it was privatised in 1984. They were succeeded by the aluminium-framed KX100, most of which have since been ripped out with the inexorable rise of mobile phones. Historic England has appealed to phone box enthusiasts to help the search for unrecorded K8s.

SOURCE: *The Guardian,* 20 July 2023

Underground squatter evicted in Israel after 50 years

An elderly squatter who spent 50 years building an underground labyrinthine cave home on Israel's coast is facing eviction. The country's Environmental Protection Ministry served an eviction notice to remove Nissim Kahlon, 77, from his elaborate home built into the sandstone cliffs of Herzliya beach, north of Tel Aviv.

Filled with chiselled tunnels, detailed mosaic floors and a network of staircases and chambers, the structure is

'illegal' and threatens Israel's coastline, according to the ministry. But Mr Kahlon has vowed never to leave and said authorities would have to 'bury' him in the cave to get rid of him. 'I am not leaving here. I am ready for them to bury me here,' said Kahlon, a gruff but amiable chatterbox with a grey beard and beret. 'I have nowhere to go, I have no other home.'

Kahlon was living in a tent along the Herzliya beach north of Tel Aviv in 1973 when he says he began scratching into the sandstone cliffs and moved into a cave he carved. Over time, his simple hole in the wall turned into a real-life sandcastle on steroids, filled with recycled wood, metal, ceramic and stone.

Nearly every surface of his main quarters is covered in elaborate mosaics, made from discarded tiles of every colour that he collected from dumpsters in Tel Aviv over the years. Recycled glass bottles serve as decoration and insulation on exterior walls. Every wall in the labyrinthine complex is curved, and stairways bend and branch through the bedrock to chambers of different design and purpose.

The complex has plumbing, a phone line and electric lighting in its many rooms and Mr Kahlon insists his construction is sturdy. 'From the stones I quarry I make a cast and build a wall. There´s no waste here, only material, that´s the logic,' he said. 'Everything is useful, there´s no trash. Instead of encouraging me, they are denigrating me.' Mr Kahlon said he received a demolition order back in 1974 that was never carried out. Since then, he says has never heard any opposition from the authorities until last year. The eviction is on hold until later this month to give him time to appeal.

He acknowledges he never received a building permit but his main argument is that local authorities connected his cave to the electric grid decades ago. His cave home is on the outskirts of Herzliya, a seafront city 8 miles north of Tel Aviv. It stands in contrast to the luxury homes that dot much of the beachside town – one of the most exclusive addresses in a country with a dire housing crunch.

SOURCE: *MailOnline,* 13 July 2023

Delicacy kikurage cultivated in WWII bomb shelter

An air-raid shelter in Kawasaki city south of Tokyo, originally built to protect Japanese citizens from U.S. bombs, has been transformed into a farm for kikurage, a delectable edible fungus.

It was 2013 when now 55-year-old Hitomi Koyama, an employee of agricultural heater company Netsugen Inc., discovered a 3-meter-wide, 2-meter-tall, 13-meter-long shelter in a bamboo grove on the company's property. She had heard about such shelters from locals, but actually setting foot in the eerily quiet, dusky passageway, she recalled, "gave me shivers and goosebumps. It was really frightening."

Historical records revealed that, during World War II, 39 girls from a primary school in what is now the city's Kawasaki Ward were evacuated to Jyonenji temple, not far from the bamboo grove. Since before the war, Kawasaki has been a thriving industrial city, and became a major military production centre.

U.S. bomber forces targeted the large factories in Kawasaki's waterfront area, and in one April 15, 1945 raid, some 200 B-29 bombers dropped more than 10,000 incendiaries and other munitions on the city, damaging or destroying 33,361 homes and killing or injuring at least 100,000 people. The bomb shelter had apparently been built to protect the evacuated girls.

"Property values decline when an air-raid shelter is found, so normally, people will cover them up. But I thought it was necessary to preserve this one," Koyama said. She wanted to utilize the shelter and make its history known, and a chat with local farmers inspired her to begin cultivating kikurage, a popular ramen ingredient also called black fungus and wood ear.

The ambient temperature inside the shelter ranges from 15 degrees C in winter to 25 degrees in summer. Kikurage grows between 20 and 25 degrees, so with a small amount of heating in the winter, the fungus can be cultivated year-round.

To encourage people to think deeply about what it means to live in a world where air-raid shelters exist, the product began to be distributed in 2017 with the eye-grabbing name "bomb shelter kikurage." Word of the product spread, and in October 2020 it was selected by the city of Kawasaki as a thank-you gift under the "hometown tax" system, in which regional specialties and tax credits are offered in exchange for donations to municipalities.

Currently, up to around 400 kilograms of kikurage are being harvested a month. Popular for its chewy texture,

it's available for purchase online and at the Japan Agricultural Cooperatives (JA) Ceresa Kawasaki's farmers' markets.

Tours of the repurposed air-raid shelter may be offered in the future. As the product has become famous, the company has received nearly 30 inquiries about tours, such as for school children's summer research projects.

SOURCE: *The Mainichi,* 8 May 2023

Hidden garden in London's 'supersewer'

What do you do with an old London sewer that plans to prevent millions of tonnes of raw sewage entering the Thames every year? You cover it in celebratory flowers, of course. Fifty metres below the streets of London a magical multi-coloured garden has been installed to pay homage to the positive environmental impact that the Thames Tideway Tunnel (or the super-sewer, as it's more fondly known) will have on London.

London currently relies on a 150-year-old sewer system that was originally built for a population less than half its current size and so it can't quite manage what's expected of it. As a result of this, tens of millions of tonnes of sewage spills into the River Thames every year.

The super sewer, however, will prevent 95% of these sewage spills once it's fully operational in 2025 and will create a much cleaner and healthier river environment. With a healthier river in the pipeline; Loo Gardens as it has been named has been created to symbolise the ecological benefits that the Tideway project will have, not just on the river itself, but also on the hundreds of species of fish, birds, mammals and riverside flora that inhabit it.

This unique underground oasis will be adorned with artificial plants and flowers (due to the lack of natural light) and elements of the garden have also been created using repurposed waste, cleared from the river and its banks. Andy Mitchell, CEO of Tideway, said: "We're thrilled to unveil Loo Gardens – an underground oasis that symbolises the incredible environmental legacy that the Thames Tideway Tunnel will offer London and its communities for years to come. This subterranean haven provides a multisensory experience, featuring the nature that will thrive once the super-sewer is fully up and running. The garden points to a cleaner, greener future and an example of the long-lasting legacy the tunnel will leave, far outlasting its construction."

A handful of lucky Londoners (already chosen) will be given the chance to get up-close-and-personal with the tunnel and its gardens before the sewer is officially activated next year.

SOURCE: *Secret London,* 3 July 2023

NEWS – PUBLICATIONS AND BOOK REVIEWS

London Tube Stations 1924-1961

ABBOTT, Joshua and BUTLER, Philip, 2023, FUEL Design and Publishing, 160x200 mm hardback, 200pp, £24.95, ISBN: 9781-73988-782-7

Book review by Martin Dixon

Many enthusiasts view the archetypal London Underground station design as one of the oxblood red-tiled structures designed by Leslie Green in the early 1900s. But the expansion of the tube network either side of World War II led to a rich seam of more adventurous stations in a style dubbed 'Mediaeval Modernism' and this book documents these structures.

London Tube Stations 1924-1961 is a successful mixture of photographs and text, benefiting from having dual authors. The text is by Joshua Abbot, a historian based in Welwyn Garden City who specialises in London's modernist architecture. The photographs (excluding a few archive shots) are by Philip Butler, whose previous works include a splendid volume documenting the UK's Odeon cinema chain.

After an introductory section, the book is structured line by line and within this, station by station. Each station has a full page photo, generally of the surface building or station entrance. Opposite this is a paragraph of text and one or more smaller photos, often showing platform or tiling detail. The volume finishes with a short section on demolished stations. There is a useful index and a short bibliography to close.

Overall there are almost ninety stations featured, of which 37 are listed structures. The majority of the latter were designed by probably the best known architect of the period, Charles Henry Holden. Holden developed a close relationship with Frank Pick, the then Commercial Director of Underground Electric Railways Limited. Pick

also oversaw other modernist design changes to aspects such as advertising, Harry Beck's iconic route diagram and the classic Johnston typeface.

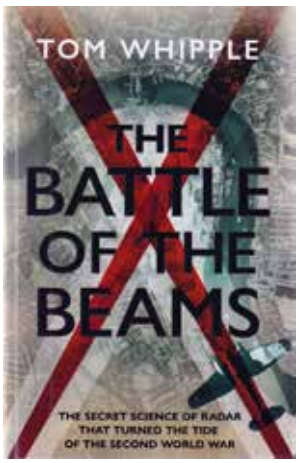
The book is well written with a date, architect and listing details shown for each station. There is a nice colour coding to the stations, featuring a separator in the appropriate Underground line colour. The exterior shots are well framed; many are taken at night or in overcast conditions which makes some of the architectural detail more difficult to discern. Unexpected details of interior shots include a swastika tiled floor pattern at Upminster Bridge and decorative ventilation grilles at Bounds Green and Wood Green featuring fauna and flora.

On the downside, the small format of the book isn't ideal for photo reproduction. The main images have a white border and I would have preferred if they extended right to the page edges, adding around 25 percent more surface area. Some of the captions in the introductory sections are captioned sideways on the opposite page and this text is in danger of getting lost in the binding. The only map featured is a 1947 guide to Main Line termini; one or more maps showing the featured stations would help readers – especially those from outside the metropolis.

Overall this book forms a useful addition to both underground and architecture enthusiasts, especially if bookshelf space is limited. The images and historical context should satisfy all but the most assiduous reader. Its size makes it ideal to have to hand if you find yourself in London with a Travelcard and a spare hour or two to explore the suburbs.

The Battle of the Beams

WHIPPLE, Tom, 2023, Bantam Press, 320pp, 16.2cm x 24.2cm, £20
ISBN: 9781-78763-413-8



Book Review by Martin Dixon

Tom Whipple is the science editor at *The Times* and has written this very accessible book on the history of the use of radio technology for detection and navigation in World War II. The subtitle – *The secret science of Radar that turned the tide of WWII* – is somewhat misleading as the volume covers much more than Radar and a good deal of the text describes radio-based navigation systems used by both Allied and Axis forces.

The author's fascination with the topic was triggered in part by the fact that both his paternal grandparents worked as wartime radio scientists. I too must declare an interest in that my father also worked in Radar. Officially he was a Fire Control Instructor in the Royal Artillery but in reality he spent most of the war operating a Radar set atop the mountains of Mauritius. He felt that his safe return to the UK was largely due to his specialist position, to the extent that he named his first house *Klystron* after the high-powered microwave generating valve.

But I digress, and getting back to the book, the contents are split equally between sections entitled Defence and Attack. The former focuses on countering the threat to Britain by the Luftwaffe (principally by understanding and then denying them their precision bombing tools Knickebein, X-Gerät and Y-Gerät).

The second half of the book focuses on the use of Radar and radio navigation by the Allies to attack and invade our foes, in particular across the (English) Channel. A concise (maybe too concise) timeline precedes the text while the body of the book is followed by chapter notes that describe sources and suggest further reading without intrusive footnotes. A comprehensive index completes the book.

The narrative is very easy to absorb and has a good balance between the roles of scientists, intelligence agents and armed forces and includes the brave actions of special forces and photo-reconnaissance pilots in getting visible and tangible details of our enemy's capabilities. Where scientific details and principles are described, this is done in an accessible way that doesn't demand A-level physics.

A key player throughout the book is RV Jones, who in 1978 published his wartime autobiography as *Most Secret War*. Alongside the National Archive, Jones' papers (held in the Churchill College Archive) are used as a main source and thus this latest publication has unavoidable overlap with the earlier volume.

Jones' appointment was as Assistant Director of Intelligence (Science) and in early years he had neither a Director to assist, nor anyone to direct. Despite this solitary existence Jones managed to directly influence Churchill although he has been criticised for overstating his personal contribution. This book's presentation is more balanced and perhaps less embellished.

Deception schemes ranging from retransmitting German navigational signals from Alexandra Palace, the processing (and bugging) of captured Luftwaffe crew at Trent Park and the use of 'window' to deceive enemy Radars are particularly well covered. The diagrams within the book are very useful; I particularly liked the depiction of a German Würzburg plotting table which looks like an early predecessor of the ROTOR Kelvin Hughes projection system.

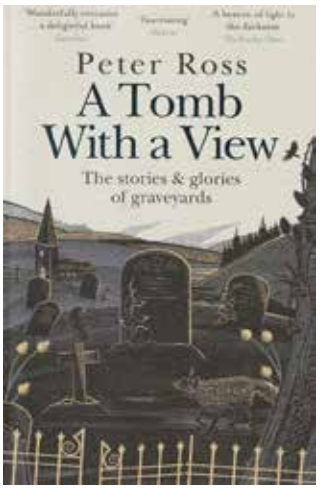
There are only a handful of photographs which is a shame but the two used as backdrops to the main section headings are quite effective. It was good to see coverage of naval aspects of Radar; this includes the *Graf Spee*, the 'Channel dash' of the *Scharnhorst* and *Gneisenau* as well

as D-Day action. Compared to their German equivalents, the description of the British counterparts – Gee and Oboe – is relatively cursory.

Overall, the book is an easy and pleasant read – describing the technology race via a series of linked narratives rather than being a heavy technical treatise. If however you are already well-briefed on the key aspects of this crucial aspect of World War II then you may find insufficient new content to satisfy you.

A Tomb with a View

ROSS, Peter, 2021, *Headline* Publishing, 368pp, £10.99, ISBN: 9781-47226-778-8



Book Review by Martin Dixon

I first came across this book by chance, when listening to Radio 4's *Book of the Week* earlier this year. And jolly glad I was to have discovered it.

The book describes cemeteries, crypts, catacombs and other burial sites mostly, but not exclusively, across the UK and Ireland. The content includes architecture and history, biography and mystery but overall this is a book about fascinating lives rather than memorials to the dead. The book describes cemeteries as 'Parks for Introverts' which is an intriguing concept. A number of sites that have been the subject of Sub Brit visits, articles or talks are included within the pages such as Rothwell Bone Crypt, Brompton and Highgate Cemeteries.

The overall theme is perhaps that a burial place provides a link to a person's life and that small details can act as a pathway to intriguing facts. A memorial in Whitby records the resting place of a married couple who were born, married and died on September 19th, in all three cases in the same year.

A gravestone in Highgate Cemetery has a corner deliberately broken off and has been replaced by Lego bricks; a reflection of the love of Sonny Anderson who died too young. A simple gravestone marked 'Mark Sheridan Comedian' leads to the unearthing (not literally!) of the man who popularised *"I do like to be beside the seaside"*, before his apparent suicide after bad reviews of his latest show.

Some of the stories seem straight out of the pages of fiction. At Brompton Cemetery lie the remains of Marchesa Luisa Casati. Both her outfits and behaviour were outrageous; one of her outfits was lit by electric light bulbs with its own generator and it was rumoured she kept the cremated ashes of former lovers within wax mannequins. She is buried complete with false eyelashes and her taxidermied Pekinese.

The book is structured with each chapter describing a single (or genre of) cemetery. Most of these are traditional Christian sites but there are also details of Muslim burials, ossuaries and green burials. One particular compelling chapter tells the story of the Commonwealth War Graves Commission and their detailed forensic work in determining the identity of the fallen long after their final battle.

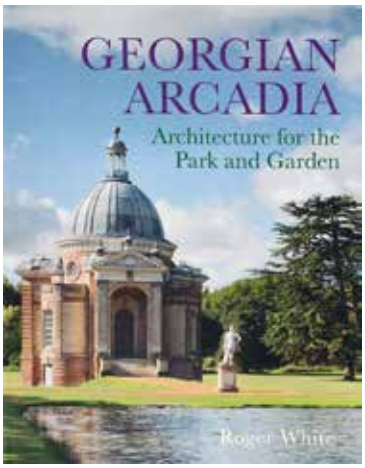
The author, Peter Ross, is a Scottish journalist and his writing is precise, and supported by both written sources, relatives and local experts. A couple of dozen or so photos support the text but these are generally pretty washed-out black and white images and so act more as chapter markers than significant pictorial support. There is a useful index but I suspect most readers will read from cover to cover rather than use as a reference volume.

A number of lines and quotes are taken from other authors and interviewees and these are assiduously attributed. It's obviously impossible to check all the facts stated but one assertion that I would challenge is that of the 14,000 cemeteries and churchyards in the UK, only 3,500 date from before World War I. In my experience, the vast majority of graveyards have Victorian or earlier burials.

Overall, however, I'd thoroughly recommend the book for reflective and instructive reading. Taphophiles (look it up!) across Sub Brit will, I am sure, be dying to read this book.

Georgian Arcadia: Architecture for the Park and Garden

WHITE, Roger, 2023, Yale University Press, 352pp, 266 x 215mm, £40 ISBN: 9780-30024-995-8



Book Review by Martin Dixon

Our founder Sylvia Beamon had a particular interest in ice houses but there is much else underground across country estates of interest to Sub Brit members. Roger White, a leading authority on Georgian Landscape Architecture, has compiled this comprehensive volume which describes – and crucially illustrates – a wide range of structures originally constructed between around 1700 and 1837, when Victoria took the throne.

Some of these structures were functional, some notionally so, but many were utter architectural indulgences. The designer of some of the structures remains a mystery but many were by renowned architects such as Wyatt, Kent, Soane and Vanbrugh.

After an introductory section, the book explores structures by loose category, starting with lodges and other entrance structures such as arches. Buildings for relaxation and enjoyment come next, from bathhouses to gazebos, suitable for entertaining guests and perhaps romantic liaisons. More erudite structures come next, including grottoes and mausolea. The final section covers more practical buildings where conservatories, stables and, of course, ice houses appear.

Much of the architecture and ideas is way over the top, including a mechanical hermit (at Hawkstone Park), giant pineapples (Dunmore) and a dairy designed as an immense Chinese temple (Woburn) complete with stained-glass windows.

The book closes with a short section illustrating the British influence on continental Europe before an index that is comprehensive for names and places but less so on building types or themes. Chapters have foot-noted references throughout. The book is profusely illustrated – both with present-day photographs and with original plans and drawings. The generous size means that much detail can be grasped from the illustrations.

Many of the buildings are lost and for these the original drawings and archive photographs are especially useful. I learnt for example about the gothic octagon at the menagerie of Wentworth Castle (where my great grandfather worked as Head Gardener) which was demolished as recently as the 1950s. Many of the extant structures are inaccessible to the public and so can only be seen through the pages of the book. The author himself encountered landowners unwilling to allow access – at least once on the pretext that it would 'frighten the pheasants'.

I would have liked to see an appendix detailing some of the major sites that are open to the public (several National Trust sites as well as privately owned estates such as Painshill and Wentworth Woodhouse spring to mind), and perhaps a map showing their location. Less inquisitive readers would perhaps be less 'hands-on'. A short glossary of architectural terms would also have been helpful for those of us who don't know their architrave from their ogee.

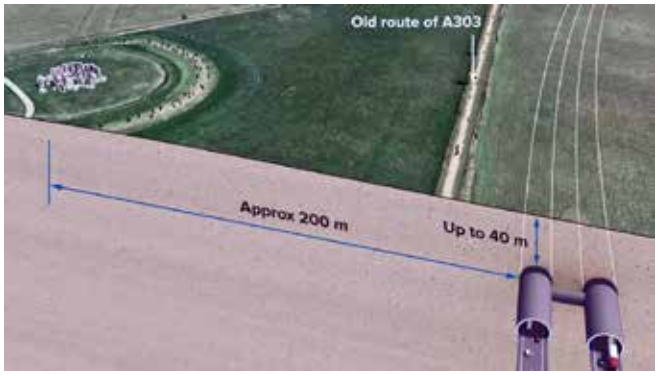
Underground works make up only a small percentage of the hundreds of sites featured so if this is your sole passion then you may be disappointed. However if you have a wider interest in the days when the aristocracy's horses, dogs and even pigs lived in greater opulence than most of the UK's human population then it is definitely worth a read.

NEWS – TRANSPORT

Work on Stonehenge tunnel could start next year

Plans to construct a road tunnel near Stonehenge have been approved, the Department for Transport and Transport Secretary Mark Harper has granted a Development Consent Order for the project on the A303 in Wiltshire.

A DCO previously issued for the £1.7 billion scheme was quashed by the High Court in July 2021 amid concern about the environmental impact on the Unesco World Heritage Site. The plans involve overhauling eight miles of the A303, including digging a two-mile tunnel from Amesbury to Berwick Down. Then-transport secretary Grant Shapps gave the go-ahead to the project in November 2020 despite advice from Planning Inspectorate officials that it would cause 'permanent, irreversible harm' to the area.



The tunnel will be built under the World Heritage Site, approximately 200m from Stonehenge

The Save Stonehenge World Heritage Site alliance successfully challenged his decision in the High Court. In a 64-page letter granting fresh approval, the DfT said Mr Harper is 'satisfied' that the project's 'harm on spatial, visual relations and settings is less than substantial and should be weighed against the public benefits'.

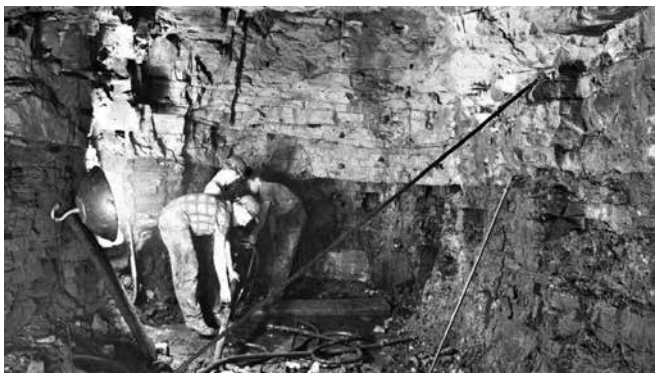
The A303 is a congestion hotspot, with drivers heading to and from the South West during peak holiday periods often stuck in long queues. The next hurdle for the project is getting the funding in place to proceed, despite the economic squeeze on the Department for Transport's budget.

While users of the A303 might be encouraged by the recent decision it feels like they'll still be able to enjoy the current view of the stones from the road for quite some time to come although work could start on the Stonehenge Tunnel project as soon as next year.

Clyde Tunnel: Unseen photos revealed on 60th anniversary

A batch of unseen archive photographs have been released to mark the 60th anniversary of the opening of the Clyde Tunnel.

Plans for the tunnel – which links north and south Glasgow – were first proposed in 1945 as ferries across the Clyde were struggling to cope with the volume of traffic. At the time, the city's docks were still in use and a new road bridge with enough clearance for ships was considered impractical.



Miners excavating the tunnel in May 1960

The tunnelling work was carried out by 16 miners

The northbound tunnel was completed in June 1963

The tunnel was officially opened by Queen Elizabeth and Prince Philip on 3 July 1963. It cost £10.5m to build, the equivalent of £180m in 2023. It has gone on to become an integral part of the city's road network, carrying more than 25 million vehicles, cyclists and pedestrians every year.

SOURCE: *BBC News Scotland,* 3 July 2023

TBMs start turning on Sydney Metro West

The first two tunnel boring machines have started carving out a section of the 24-kilometre Sydney Metro West line. The next stage of the Sydney Metro project is well and truly underway with TBM Daphne already 150 metres into its 11km journey from The Bays to Sydney Olympic Park, and TBM Beatrice 45m into its journey on the parallel tunnel. As is tunnelling tradition across the world, the Sydney Metro West TBMs are named after women to bring luck to the workers who look to Saint Barbara for protection.

TBM Daphne has been named in honour of pioneer for paralympic sport Daphne Hilton, one of the most successful Australian athletes of all time and a trailblazer for women in sport. She competed in three Paralympic Games between 1960 and 1968 and set a record that is unlikely ever to be broken – winning 14 medals across five different sports including athletics, swimming, archery, table tennis and fencing.

TBM Beatrice's namesake is iconic local newspaper seller Beatrice Bush, who sold newspapers for over 25 years from the traffic island at the intersection of Victoria Road and The Crescent in White Bay. It is estimated she sold five million papers between 1971 to 1996, passing away six days after she sold her last paper. Her life inspired songwriters, film makers, sculptors and painters.

Along with TBM excavation, construction of the tunnels includes activities like the construction of cross passages and crossover caverns. Construction of the twin metro tunnels from The Bays to Sydney Olympic Park is part of the Central Tunnelling Package awarded in July 2021 to the Acciona Ferrovial joint venture. Sydney Metro West will double the rail capacity between Sydney's two biggest CBDs once passenger services commence in 2030. Meanwhile, two of three roadheaders have started excavating tunnels that will connect the Sydney Metro West line to a new stabling and maintenance facility at Clyde.

SOURCE: *Railway Churn* No 8, 6 July 2023

HS2: Large hole opens above Chiltern tunnel near Little Missenden

A large hole has opened up in Bazzards Field, southwest of Shadloes Lake, near Little Missenden, Buckinghamshire, above part of the Chiltern tunnel that is being built for the HS2 high speed rail line. A spokesperson for the HS2 Contractors (Align JV) said they were engaging with the landowner and had notified the Environment Agency, but it was likely linked to "pre-existing ground conditions". The area is predominately porous chalk and pre-existing dissolution features or fissures are quite common.

Investigations are continuing and the area has been fenced off. HS2 said the hole measures about 4 to 6m in diameter and about 3 to 5m deep. Campaigners against HS2 said it showed it was "time to stop digging". The 10-mile Chiltern tunnel is the longest on the HS2 project,

which is designed to improve links between London, Birmingham and the north of England. Two tunnel boring machines, Florence and Cecilia, have been excavating the high speed rail project's route under the Chilterns in Buckinghamshire for the past 21 months.

The two tunnels, part of the first phase of the route between London and the West Midlands, are between the M25 and South Heath. The project has faced criticism about the impact it would have on the land the route would take, with campaigners fighting against plans to build on woodland.

SOURCE: *Below* – Journal of the Shropshire Caving and Mining Club, Summer 2023

India's first underwater railway to open in September

When commuters in the city of Kolkata (formerly Calcutta) step aboard India's first underwater train later this year, a Bengal-born British engineer who conceived an unrealised underground railway for the city over a century ago is unlikely to cross their minds.

Sir Harley Dalrymple-Hay envisioned an ambitious 10.6km underground railway with 10 stops and featuring a tunnel beneath the Hooghly river, to connect Kolkata with its twin city, Howrah. However, due to insufficient funding and doubts about the geological properties of the city's soil, this grand plan never materialised.

Eventually, in October 1984, Kolkata did become the first Indian city to get a metro railway. From just 3.4 km long and five stations, it is today a busy 26 station 31-km network, half of which runs underground. Now, in December, the metro will open India's first underwater section that will cross the Hooghly.

The twin tunnels under the river are 520 metres long and part of a 4.8 km stretch of the metro rail connecting Kolkata and Howrah. It lies 52ft below the riverbed and, once open, is expected to serve more than 3,000 commuters every hour. This underwater stretch of the metro is part of a longer link between Howrah and Salt Lake in eastern Kolkata that almost mirrors Sir Harley's 1921 design. But Sir Harley did not design just one metro line – he designed an entire underground master plan for Kolkata, with lines extending far north and south of central Kolkata.

A metro trial run through the tunnel under the Hooghly river in April

The engineer recommended the installation of escalators and fans at all stations. The larger question of the maintenance of a comfortable temperature in trains and at the underground stations is of the greatest importance; especially having regard to the high temperature at the surface at certain seasons of the year in Calcutta was addressed. When Sir Harley conceived his Kolkata plan, underground railways were already running in London, Paris and New York.

Though his tube rail plan never saw the light of day, Sir Harley has left a stamp on Kolkata. In 1928, the city's electricity supply company, CESC, asked him to build a tunnel under the Hooghly to send power cables from Kolkata to Howrah. He took up the challenge, on the condition CESC would use a contractor that he trusted. CESC agreed and in 1931 Kolkata's first underwater tunnel came into being. Sir Harley's tunnel under the Hooghly remains in use to this day. It's just that only power cables run through it, and not trains.

SOURCE: *BBC News Asia* 10 June 2023

Spain relaunch Gibraltar Strait tunnel project

The Strait of Gibraltar separates Morocco and Spain. Spain and Morocco are taking new steps to construct the 40-kilometre tunnel that will link the two countries under the Strait of Gibraltar. Spain's Minister of Transport Raquel Sanchez has said that the two countries will give momentum to the studies of the project. Sanchez added that the project is a "strategic" one, not only for Spain and Morocco, but also for Europe and Africa.

Improved relations and the recent high-level meeting have helped the project find new life The project was reportedly revived during a meeting between Sanchez and his Moroccan counterpart Nizar Baraka. The pair met during the recent high-level meeting between the two countries and reactivated the studies for the project. Plans for the tunnel date back to 1979 with the signing of the Spanish-Moroccan joint declaration.

Despite ample financing from institutions such as the World Bank, European Investment Bank, and African Development Fund, the project kept getting shelved due to various diplomatic troubles between the two countries. However, in light of the recently improved diplomatic relations, the project seems to have been revitalized.

In March 2022, Spain expressed support for Morocco's Autonomy Plan on its stance regarding the Western Sahara dispute, and the two countries have been working to improve cooperation since. High-level officials, including both countries' heads of government, met in Rabat in April in a meeting that saw the signing of 19 bilateral cooperation agreements.

The tunnel project, if it goes through, is expected to benefit both parties, allowing more rational use of storage and transport infrastructures, as well as reduced cost for shipments between the two countries and for travel. Morocco's Prime Minister Aziz Akhannouch mentioned the project provides opportunities to "build the future" which he hopes will bring about a real revolution at several levels.

It can additionally improve ties between Europe and Africa, as Morocco has been acting as a gateway for European countries and investors into the rest of the continent. However, the depth of the Strait of Gibraltar, as well as its wind and wave patterns, is expected to pose difficulties in the construction of the tunnel, although it remains to be seen what type of effect it could have on the cost and the project's anticipated start date. As of October 2022, construction for the project was expected to begin in 2030.

SOURCE: *Railway Churn International,* Issue 12, 6 June 2023

NEWS – TUNNELS AND TUNNELLING

London's super-sewer nears completion as cost climbs to £4.5bn

The huge 'super-sewer' that will stop the vast majority of discharges of effluent into the Thames is 90 percent complete, an investor report revealed today. The 15-mile tunnel will start diverting sewage away from the river next year and is expected to be fully operational by 2025 according to Tideway, the company behind the infrastructure.

The latest estimate of the final cost is a two percent increase on the previous figure. When it was first announced in 2014 the cost was estimated at £3.5 billion. Tideway said: "When fully operational in 2025 the new infrastructure will capture 95 percent of overflows from London's sewerage network, dramatically improving the water quality of the Thames and delivering significant environmental benefits."

In February six cyclists got the chance to cycle through the super sewer ahead of its completion

An average 39 million cubic metres a year of water contaminated by sewage is routinely pumped into the Thames when it rains to prevent flooding.

SOURCE: *Evening Standard*, 24 April 2023

Berlin Wall escape tunnel discovered by builders then lost

Builders have found an escape tunnel that ran under the Berlin Wall at Bernauer Strasse, scene of many attempts to flee East Germany. It was dug by a construction worker and his colleagues from West Berlin in spring 1970, using a rented shop, as the man tried to get his family out of Soviet-controlled Berlin and the Communist German Democratic Republic.

When the tunnel (still in good condition 53 years later) reached 279ft it was discovered by a listening post run by the Stasi, the East's infamous secret police. On 2 May 1970, officials picked up "noticeably loud noises" late at night and three days later East German border guards began digging and discovered the tunnel at a depth of 4m and measuring 55cm by 85cm. It was professionally braced with squared timber and boards. It was the end of a family's hope for a safe escape.

Between 1920 and 2001, Bernauer Strasse separated the two districts of Mitte and Wedding. This was unremarkable until 1945, when the conquered capital of the Third Reich was divided into four sectors. Mitte belonged to the Soviet sector and Wedding to the French, in the free West. Many doors and windows of the houses on the East side of the street were bricked up when the wall was built to stop East Germans seeing.

As the sector was closed overnight in August 1961, people in East Berlin jumped over barriers and out of windows to escape into West Berlin. At least 75 tunnels were dug from West Berlin between October 1961 and April 1982 and 12 were on Bernauer Strasse. Only 19

were successfully used, with up to 426 people escaping. Despite the wall, 5,000 East Berliners managed to get to the West; 192 died trying, with ten people killed on Bernauer Strasse.

This tunnel under the Berlin Wall at Bernauer Strasse can be viewed by the public

There is anger that the latest discovery from such a crucial period in Berlin's history has now been filled in and will lie under a new building project. "I am appalled that the floor slab has already been concreted over," said Dietmar Arnold, chairman of the Berlin Underworlds Association, a historical body. "The opportunity to carry out further research on an originally preserved escape tunnel has been missed."

SOURCE: *The Times,* 19 June 2023

Wendy's fast food stores to deliver food orders though tunnels

After announcing plans to use an AI chatbot at its drive-thrus, now Wendy's is piloting a robot-powered 'underground delivery system' for online order pickups. The system, which will be built through a partnership with the autonomous logistics company Pipedream, will have robots travel through tunnels to transport online food orders from Wendy's kitchens to the "Instant Pickup portals" that sit beside parking spaces.

Cars will pull up beside an Instant Pickup portal

When a customer arrives at a space, they talk to the restaurant crew through the Instant Pickup portal's speaker to confirm their order. From there, an autonomous robot will traverse a set of tunnels to deliver the food to the customer's parking space. Wendy's says Pipedream's system uses "temperature-controlled delivery technology" that should help prevent food from getting cold (or too warm) while in transit and keeps customers from having to go inside or wait at a drive-thru to grab their food.

As mobile ordering preferences increase, they are to be the first quick-service restaurant to partner with Pipedream, leveraging their unique delivery technology and system with the goal of reinventing digital pick-ups to bring more Wendy's to more people as quickly and efficiently as possible. Wendy's says it is planning to test the system at an existing restaurant later this year.

SOURCE: *The Verge,* 17 May 2023

Late News

Terraced home with cave in the basement goes on sale

A humble terraced house with an incredible cave complex is back on the market - for nearly £100,000 more than when it was last sold. From the outside, the Shropshire property, which is on the market for £295,000, appears to be a typical two-bed one-bath terraced home. However, the mystical home boasts a secret cave in the basement made of sandstone, as well as vaulted ceilings and 24 pillars.

The stunning cave was hand-carved and built by its previous owner, eccentric artist Anthony Dracup, in the mid-1990s.

SOURCE *MailOnline* 26 July 2023

Photography Competition 2022

Neil Iosson

Sub Brit is pleased to announce the winners of last year's photography competition. The results were first shown to members at the Spring meeting/AGM last March and now we are able to publish the full list of winners and share some of the winning images.

The competition invited entrants to capture the atmosphere, history or character of a location or express why a place or site is important. Members were allowed to enter a maximum of five photographs across any category and there was a separate public category. All images had to be of UK sites, except for the international category.

Entries were judged anonymously by the Sub Brit committee. The overall best image and the Public category first prize won a year's membership to Sub Brit. All the other awards offered bragging rights and a sense of achievement. Some of the images which are suitable will be used for the landing page of the Sub Brit website. **The Overall Winner was James Bentley.**

The full collection of entries and winners can be found in an online gallery at **www.bit.ly/subbrit_photo22**

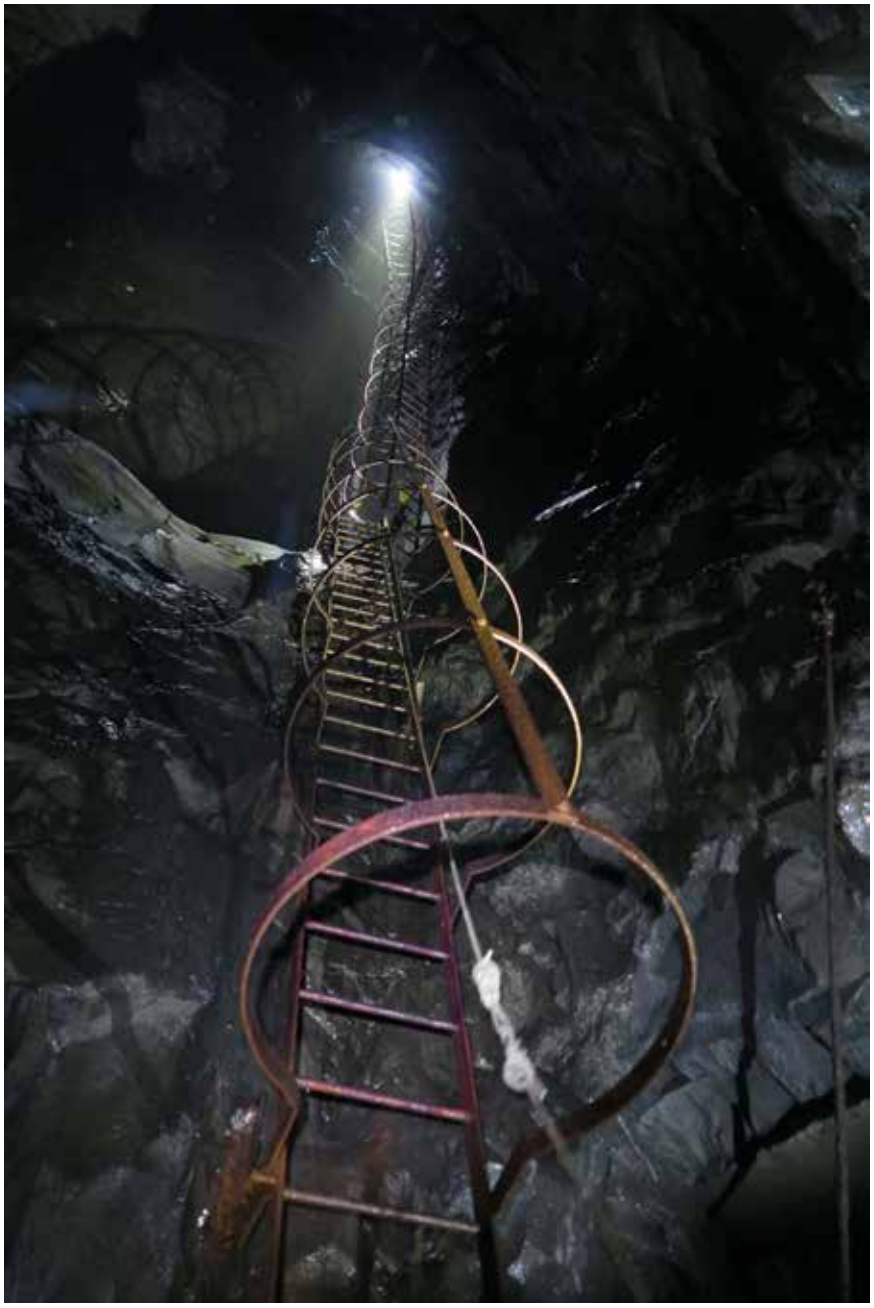
We are running the competition again this year and more information will be included in the next issue of *Subterranea*.

The category winners were:

Civilian	Nick Combes
Cold War	Mark Dalton
Industrial	Clive Penfold
International	John Philippe Guichard
Military (joint winners)	Alistair Graham Kerr and Nick Combes
People (joint winners)	Chris Jones and Clive Penfold
Transport and infrastructure	Andy Davis
Weird and wonderful	James Bentley
Public (Open to all)	Edward Coughlan

London Road, Portsmouth shelter.
Photo Nick Combes

Dirty dishes at Stenigot Ace High, Lincolnshire.
Photo Mark Dalton



Welsh slate mine near Machynlleth.
Photo Clive Penfold

German tunnel, Aisne, France.
Photo John Philippe Guichard

One of our submarines is missing, not here? Bay of Kotor. Photo Alistair Graham Kerr

Langden Hole deep shelter, Dover. Photo Nick Combes

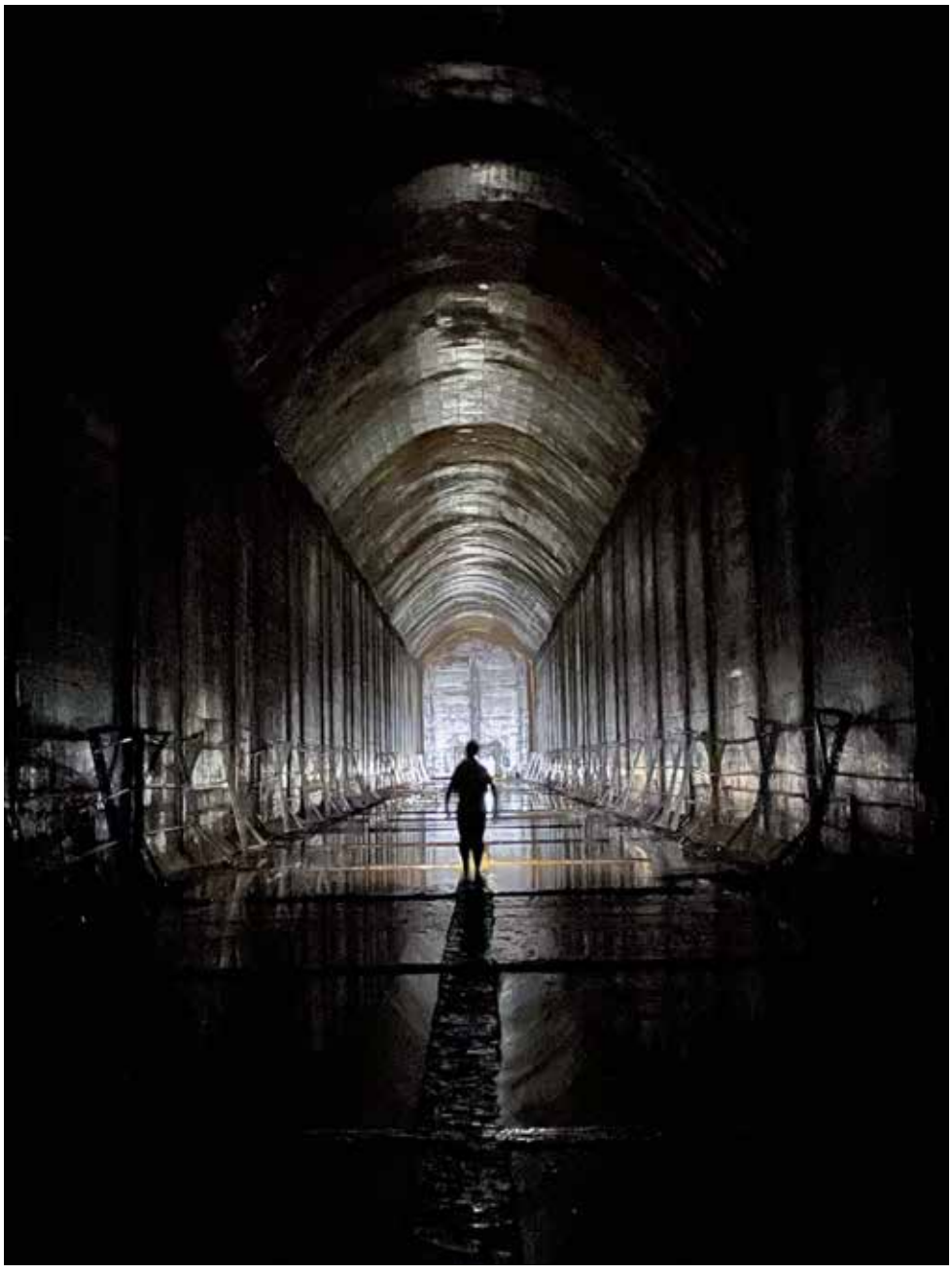
Gypsum Mine, Kirby Thore, Cumbria. Photo Chris Jones

Tim Wellburn – NAMHO 2019.
Photo Clive Penfold

Passageway at Piccadilly Circus station.
Photo Andy Davis

Site of old rock crusher,
Middleton Mine, Derbyshire.
Photo Edward Coghlan

Cavernous – Invergordon,
Scotland.
Photo James Bentley



Jutland Study Tour April 2023

Sharon Brown reports on Sub Brit's weekend in Denmark

Access tunnel to the two rings at Regan Vest. Photo Dave Maguire

The base for the weekend's activities was Aalborg in northern Denmark, the country's fourth largest city. We flew from a relaxed Southampton Airport, via the very hectic Schiphol Airport in Amsterdam, landing in Aalborg early afternoon on Friday 21 April, where we caught the new shuttle train for the 15-minute trip to the central station.

Aalborg

Many of the group arrived on the Thursday and spent Friday exploring the city, which has several good museums of interest.

For our part, we explored the waterfront area and wandered around the castle, which was built between 1539 and 1555 as a fortress. Proving unsuitable as a fortification, it became the seat of power for the king's provincial governors in Northern Jutland. Now a listed monument, it forms part of the city's green open spaces.

Our accommodation at the Cabinn Hotel can be described as adequate. Perhaps the clue was in the name, with the rooms being a tight fit for even the more flexible amongst us! However, they laid out a good spread for breakfast and provided all the necessary paraphernalia for us to make packed lunches on the two days of our excursions.

Day One: Civil Defence Command Bunker, Hadsund

Saturday morning saw us all pile into the waiting coach for a 45-minute drive south to Hadsund, arriving at an industrial estate on the north side of the town to find the Cold War Command Bunker for the local civil defence. We were greeted by two knowledgeable volunteer guides.

Guides at the Hadsund Civil Defence Bunker. Photo Sharon Brown

Hadsund originally had a command centre under the school in town, as was usual in many places around Denmark, due to financial and discretionary considerations. It was a so-called category II bunker which was to be considered temporary in nature.

When Falk's rescue corps (an organisation founded in 1906 to help in emergency situations) built a new station in 1981 the local civil defence commission applied to the Civil Defence Agency for a grant to build a new command centre next to it. However, the Danish CDA only found itself in a position to grant that application a few years later, with the facility being built between September 1987 and March 1988, making it one of the most modern in the country.

Built from reinforced concrete and covered with earth, the bunker could withstand an atomic bomb similar to the one dropped over Hiroshima at a distance of a few hundred yards. As the threat of war diminished, the need for command centres declined and a majority of the hundred or more bunkers closed in 2003 or just after.

The newer Crisis Management Centres established in recent times have more modern technology and communications but are rarely as structurally secure. The command centre at Hadsund has never been used in earnest. There was talk of activating it during one particularly heavy snowstorm, but it did not prove necessary, and therefore it has only ever been used for local exercises, training and meetings.

Sub Brit descending into the Civil Defence Bunker. Photo Robert Wood

We descended a flight of steps to access the bunker through the armoured door and gas lock. In the oldest command centres, entrance doors are typically armoured doors salvaged from redundant west coast German defences, but Hadsund, being a newer bunker, has a more modern arrangement. The room with the power generator is situated here, outside the airtight area as it would need minimal maintenance and the exhaust gases could not be allowed to pollute the bunker.

As one enters the bunker, the ventilation system is to the right. Circuitry to keep out chemical, biological and atomic contamination is installed on the ventilation system, but the effective timescales that this would work for would all depend on the substances to be dealt with. The ventilation system can be operated manually in the event of power failure. The bunker has pressure release valves that will open automatically when overpressure is detected, in order to keep toxic gases out. The valves switch automatically if the bunker is hit by a pressure wave from an explosion.

'Modern' entrance door. Photo Sharon Brown

Shower room for compulsory 'de-zombification'! Photo Sharon Brown

Next come the bathrooms – complete with an irradiated Zombie! – and then ahead is the kitchen area, where our hosts had very generously provided soft drinks, tea and biscuits. To one side of the kitchen is the escape hatch and ladder. The bunker has its own borehole so is self-sufficient with water.

The bunker's emergency escape exit. Photo Sharon Brown

Situated on the left-hand side of the bunker is the operations room, and an activation of the emergency plan would bring it to life. From this room the police, civil defence personnel, the mayor and council officials and technical advisors would prepare, implement, co-ordinate and monitor the situations arising.

The staff also consisted of specially trained personnel with knowledge of Atomic, Biological and Chemical (ABC) warfare who would register events and give recommendations on damage limitation.

There was also a logger who had to record all the decisions that were made. Technical aids, city maps and supply diagrams for essential services would be made available. This room has the Situation and Action Board, which gives an overview and records which work teams are available in each street.

The operations room, showing the Situation and Action Board at the rear. Photo Sharon Brown

When a unit receives an emergency order, the corresponding coloured tab would be moved. Red indicates the Fire Group, green the Rescue Group, yellow for the Technical Service, black for the Clean Up Service, blue for Food and Accommodation, white for Ambulance Service and pink for the ABC and Signal Service.

Adjacent is the Signal Room, which would receive all communications and deliver messages though a hatch to the operations desks. To supplement public reports of damage each civil defence area would set up mobile reconnaissance teams, contact points and observation posts.

The Signal Room for receiving communications. Photo Robert Wood

After approximately an hour, everyone thanked our hosts for an excellent visit and made their way back up into the sunshine and on to the coach for the journey 45 minutes northwest to the highlight of our weekend: Regan Vest.

Regan Vest Cold War bunker

Regan Vest, a 1960s-built Cold War relocation facility for the Danish government and Royal House, has only very recently opened to the public as a museum, and Lars Hansson brilliantly managed to secure a private group booking for Sub Brit.

There was a very comprehensive article written by Poul Holt Pedersen in the December 2022 Issue 61 of *Subterranea* which gives a lot of technical information about the site, and Martin Dixon also reviewed Poul's book in that issue. Therefore, I will here concentrate a little more on the personal side of our visit.

We arrived at Regan Vest just on lunchtime and had an hour or so to spare before our ticket entry times. A majority of the group opted to walk up the hill on a circular route to look at the bunker's exhaust towers and emergency exit – a modest climb from approximately 15 to 70 metres elevation.

By one of the towers there was a metal framework lying on the ground which originally would have been positionable on top of the tower. This was a hoist framework to assist with the evacuation of any injured personnel who could not use the escape ladders. Inside the bunker we would see the contraption used to extract the injured.

Once back down the hill we visited the master machinist's house. Except during exercises, very few people entered the bunker on a daily basis. The master machinist, or chief

One of Regan Vest's vents with the escape framework in the foreground. Photo Sharon Brown

engineer, was one of them. He lived with his family in this house in front of the entrance to the bunker and it has been fitted out as it might have looked in 1980. As with most of these 'undercover' houses, the office room has a perfect view down the road for advance warning of unwelcome visitors.

One snippet of a story concerned the emptying of the septic tank for the property. One year, the tanker driver was new, and had not been to the property before. He removed the cover and was astounded at the size of the tank. His reaction was: "There must be a lot of people living in that house there!"

Robert Lawrence leaving the Machinist's house. Photo Robert Wood

Everyone who worked at the facility had to sign non-disclosure agreements, which often meant that families had no idea that other family members had any knowledge of the bunker. They would probably never have been on exercise at the complex together.

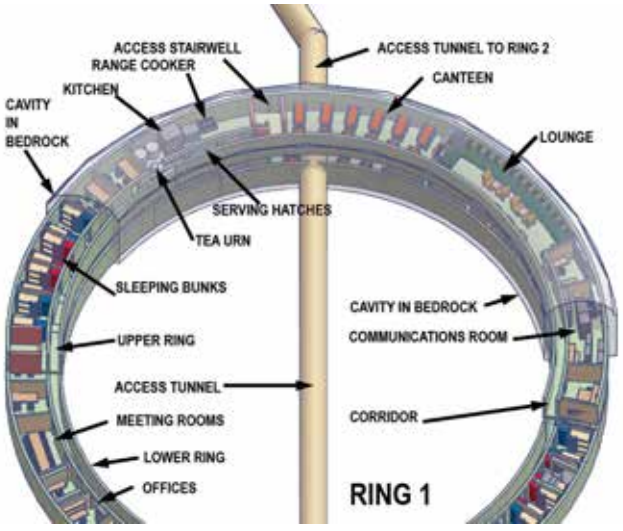
The tour begins

The museum's reception area is set up well with an exhibition hall, café, toilets and free to use locker room, as large bags are not allowed inside the bunker. We were split into four groups and entered the complex with our respective guides at staggered intervals for the 90-minute tour. The rules state that no photography is allowed within the bunker, but thankfully some of our number established that this was only so as not to hold up the travel through the complex, so we did get some photographs of the inside.

Approaching the entrance of the Regan Vest bunker complex. Photo Robert Wood

On entering the bunker, we stopped at the outer police guardpost before proceeding through the tunnel on a 300-metre flat-ish walk into the hillside, ending up 60 metres below ground, where we arrived at the engine room, which housed two German Mann 500hp generators. There are six fuel tanks, each holding 12,000 litres of diesel to power the generators, which were last tested in 2019.

Opposite the engine room is the entrance to the airlock and inner guardpost, which leads to the facilities workplaces and living quarters. The bunker was designed to accommodate a maximum of 349 people but a report from 1982 states that with the air available the true figure is more like 250. Every ministry would be represented, along with the Royal household, because the Danish government cannot govern without the presence of the monarch.



Visualisation of Ring1 by Dave Maguire. Order of rooms altered to display various types.

We headed along the corridor and into the rings, where we saw the likes of the comms room (which has been upgraded for fibre internet), doctor's office, government situation room, the all-important Blue Nato telephone and the VIP room. The Regent's room is the only one that has carpet, but is otherwise still very basic, with only a picture or two on the wall.

In 1983, a private bathroom was added as it was then deemed inappropriate to expect Queen Margrethe II to do her ablutions along with everyone else!

As we approached the tail end of the tour, we had the opportunity to see how the rings had been constructed, before heading into the ventilation room. I mentioned earlier a contraption to extract the injured from the bunker – this is where it was positioned. A person would be strapped into a rocket-shaped device and then hauled up the dark shaft using pulleys. A most uncomfortable experience as it was a very slow process, with the patient having to endure many knocks against the wall on the way up!

Apparatus for extracting injured personnel from the bunker via the vent/escape shaft. Photo Robert Wood

The dormitories were next, and with people working in shifts, a hot-bedding system was employed. We finished off with a look at the recreation room, kitchen and canteen, before heading back along the tunnel, taking care not to disturb the bats, and out into the fresh air.

Back in the reception area we finished off the visit with a look around the exhibition hall which, in Danish, documented the life of the Regan Vest bunker. We were surprised to see that included in the survival boxes on display were some British Chalwyn hurricane lamps, which would have been made at their former factory just two miles up the road from us in Poole, Dorset.

Example of a survival box – this one for lighting showing the Chalwyn hurricane lamps. Photo Dave Maguire

Rebild Centret sculpture museum

Our final visit on Day One – Saturday – was just ten minutes back up the road to a limestone mine that is now home to some lovely sculptures.

In 1926, Anders Bundgaard established Thingbaek Kalkminer together with his son Christian Andersen Bundgaard, who was given the daily responsibility of running the quarry. As they moved further into the limestone, the miners left huge halls, and Bundgaard's keen sense of dramatic aesthetics soon came into play.

Entrance to the limestone mine with some derelict workings in the foreground. Photo Sharon Brown

In 1935 the mine was opened as a museum with Anders Bundgaard's original plaster figures being given both the space and the condensed atmosphere around them which emphasizes the artistic qualities of his work. The museum and mining operated in unison until 1960 by which time the mine had become unprofitable. In 1969 sculptures by Carl Johan Bonnesens were installed and displayed. Today, these works, along with some from other artists, can be viewed in the mine.

An example of the sculptures within the mine. Photo Robert Wood

The acoustics within the mine are very good, making for good recording conditions. The site hosts festivals of light, with 3,000 candles, along with entertainment, in mid-December, Christmas and Easter. The 70 hectares (173 acres) of caverns are also home to between 300 and 600 hibernating bats each winter.

The buildings around the mine offer a small café and shop along with an extensive exhibition on Regan Vest bunker and the Cold War.

After a very full day we returned to the hotel to freshen up before heading out for a meal at the nearby Flammen Restaurant. It was a large restaurant which catered well for large parties and had been booked for both nights of our trip.

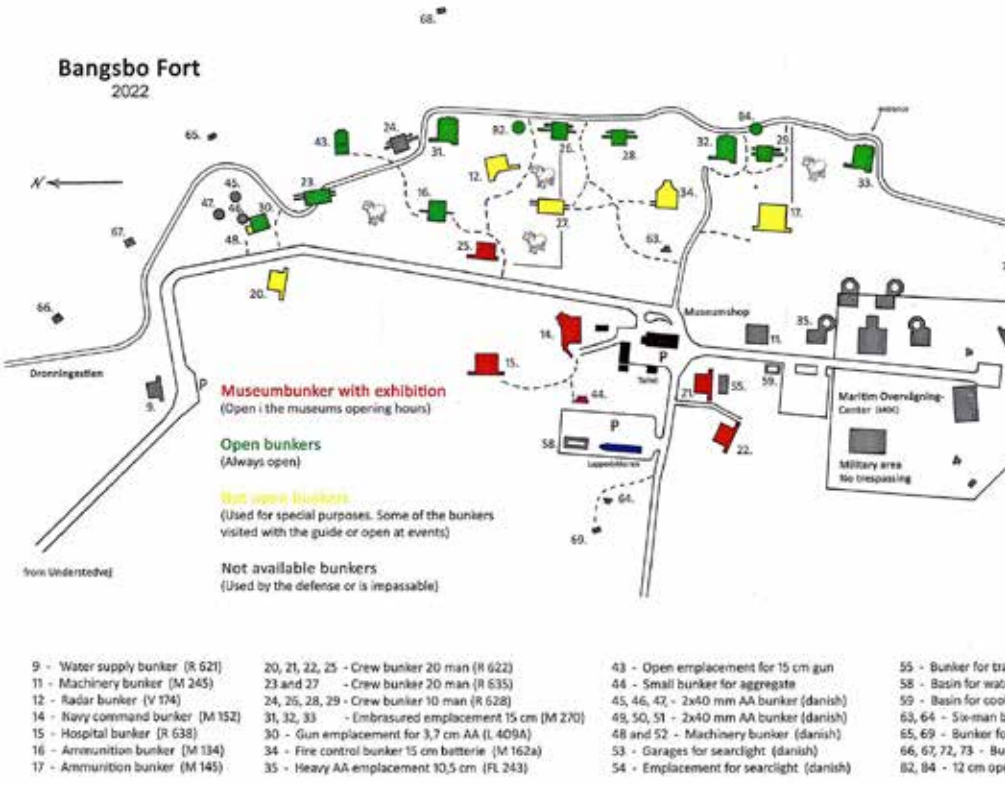
A group of hungry explorers! Photo Sharon Brown

Day 2: Bangsbo Fort and Museum

It was an early start on Sunday morning, with the coach picking us up at 08:30.

Approximately 45 minutes' drive northeast of Aalborg, on the coast, is the Bangsbo Fort complex, located on a hilltop plateau on the southern outskirts of Frederikshavn. The vantage point 82 metres above sea level provides a remarkable view out over Frederikshavn and the waters of the Kattegat. On clear days it's possible to see all the way to the town of Skagen in the north and Læsø, an island across to the east. Our guide, Kenneth Kristensen, did warn us of the possibility of vertigo at such heights!

Apart from the bunkers visible from the road, one of the first sights to confront you is the large ship stranded in the car park behind the museum shop. This land-based 'mock-up' training ship was originally used by the Navy


Bangsbo Fort
2022
Museumbunker with exhibition
(Open i the museums opening hours)
Open bunkers
(Always open)
(Used for special purposes. Some of the bunkers visited with the guide or open at events)
Not available bunkers
(Used by the defense or is impassable)
Museumshop
Military area
No trespassing
9 - Water supply bunker (R 621)
11 - Machinery bunker (M 245)
12 - Radar bunker (V 174)
14 - Navy command bunker (M 152)
15 - Hospital bunker (R 638)
16 - Ammunition bunker (M 134)
17 - Ammunition bunker (M 145)
20, 21, 22, 25 - Crew bunker 20 man (R 622)
23 and 27 - Crew bunker 20 man (R 635)
24, 26, 28, 29 - Crew bunker 10 man (R 628)
31, 32, 33 - Embrasured emplacement 15 cm (M 270)
30 - Gun emplacement for 3,7 cm AA (L 409A)
34 - Fire control bunker 15 cm batterie (M 162a)
35 - Heavy AA-emplacement 10,5 cm (FL 243)
43 - Open emplacement for 15 cm gun
44 - Small bunker for aggregate
45, 46, 47 - 2x40 mm AA bunker (danish)
49, 50, 51 - 2x40 mm AA bunker (danish)
48 and 52 - Machinery bunker (danish)
53 - Garages for searclight (danish)
54 - Emplacement for searclight (danish)

Reproduction of the map of the area as supplied within the museum leaflet

to teach new recruits how to behave on a ship before being let loose on the real thing. When it was retired from active service, it was cut into six parts, transported to the Coastal Museum and re-assembled as an exhibit.

Lappedykkeren – *the land-based training ship. Photo Sharon Brown*

Bangsbo is a World War II German coastal fort of seventy bunkers, which was later expanded by another ten bunkers during the Cold War by the Royal Danish Navy to house larger weapons from the USA. The Danish Navy still occupies part of the site. The use of the fort over two historical periods makes it unique in comparison with other fortresses from the German occupation in Denmark.

The unimpeded view from this height was the reason why the occupying German forces chose to establish the first fortified position here as early as April 1940, and why they maintained a presence here until the liberation of Denmark five years later.

Initially, it was the German Air Force that installed a mobile battery of 88mm anti-aircraft guns here, but in May 1940 this was replaced by a stationary battery of anti-aircraft guns of the same calibre operated by the German Navy. These were subsequently replaced on three occasions, and at the end of the occupation the battery was armed with powerful 10.5cm guns.

Rear of the 15cm naval gun. Photo Robert Wood

May 1940 also saw the start of work on a coastal battery that was reported ready for action towards the middle of June. This was originally equipped with German 15cm naval guns, but these were later replaced firstly with Danish 12cm coastal guns, and then again in spring 1944 with 15cm naval guns from the Danish warship *Niels Juel*, which had been seized by the Germans in 1943 after she came under fire and the captain ran her aground.

Together with the headquarters for the marine division commander and the North Jutland artillery division, the two batteries at Bangsbo constituted the 'Stronghold Frederikshavn South' installation. Up until the autumn of 1942, the position consisted of wooden barracks and earthworks, as well as some simple bunkers in thin concrete.

The first robust bunkers with walls and ceilings made of two-metre-thick concrete were completed in October 1942, and the last of a total of 34 large bunkers were finished in July 1944. The fortified position also featured 17 light concrete bunkers and 30 other concrete installations of various types. The entire area was surrounded by a triple barbed-wire fence and several minefields.

15cm naval gun. Photo Dave Maguire

The Royal Danish Navy took over the area in September 1945, initially making extensive use of the installations abandoned by the German forces. The position was later expanded to include a naval radio station and a coastal radar station. On completion of the project to extend and modernise the facility the fortified position entered service in 1952 under the new name of 'Bangsbo Fort'. The fort itself was closed in 1962, but the naval radio station and the coastal radar station remained in operation in the area. The Royal Danish Navy still uses a small part of the installation today.

In 2005, the North Jutland Coastal Museum converted part of the area that the Navy is not using into an open-air museum and bunker museum. A unique aspect of the fort is that the guns still stand in their original positions in the bunkers.

Accessing bunker 14. Photo Sharon Brown

This site is a public open space, with many bunkers that can be accessed at any time. Certain bunkers, which include exhibitions, are only accessible when the museum is open, and we started off at bunkers 14, 15 and 21.

Bunker 14 is the Command Bunker, containing an extensive exhibition of artefacts and description panels providing an overview of the German occupation of the area, the site and how much it all cost. Bunker 15 was a German hospital during the occupation but today

Communications equipment within the command bunker. Photo Sharon Brown

The crew room in bunker 21. Photo Sharon Brown

is set up to tell the story of the German airfields and refugee camps of the town. Bunker 21 is fitted out as an accommodation bunker showing the standard conditions for twenty German soldiers.

A short walk out to the clifftop brought us to Bunker 32, which houses the impressive 15cm gun from the warship *Niels Juel.* The bunker consists of an entrance area at the back, a gun room facing the sea and two rooms for the ammunition. The gun required a crew of ten men, had a range of 18 km and could fire seven shots per minute, with a firing arc of 130 degrees.

While we explored the rest of the area, our guide Kenneth opened up the shop which houses a diorama of the site and offered a number of books for sale – but I suggest brushing up on your Danish!

Hanstholm coastal battery

Hanstholm's 38cm gun. Photo Sharon Brown

Our next stop was to be the heavy coastal battery at Hanstholm which formed part of Hitler's Atlantic Wall and is approximately a two-hour drive west of the Bangsbo complex.

Construction of this complex began in November 1940 to house four 38cm guns guarding the narrow channel through the extensively mined stretch of sea between Denmark and Norway. These massive guns could fire shells weighing up to 800 kg and had a range of 55 km. Digging the foundations and pouring the concrete for each of the four bunkers took about four months, with another two to three months required to install the various equipment.

Work on the four bunkers was staggered. By May 1941, enough of the

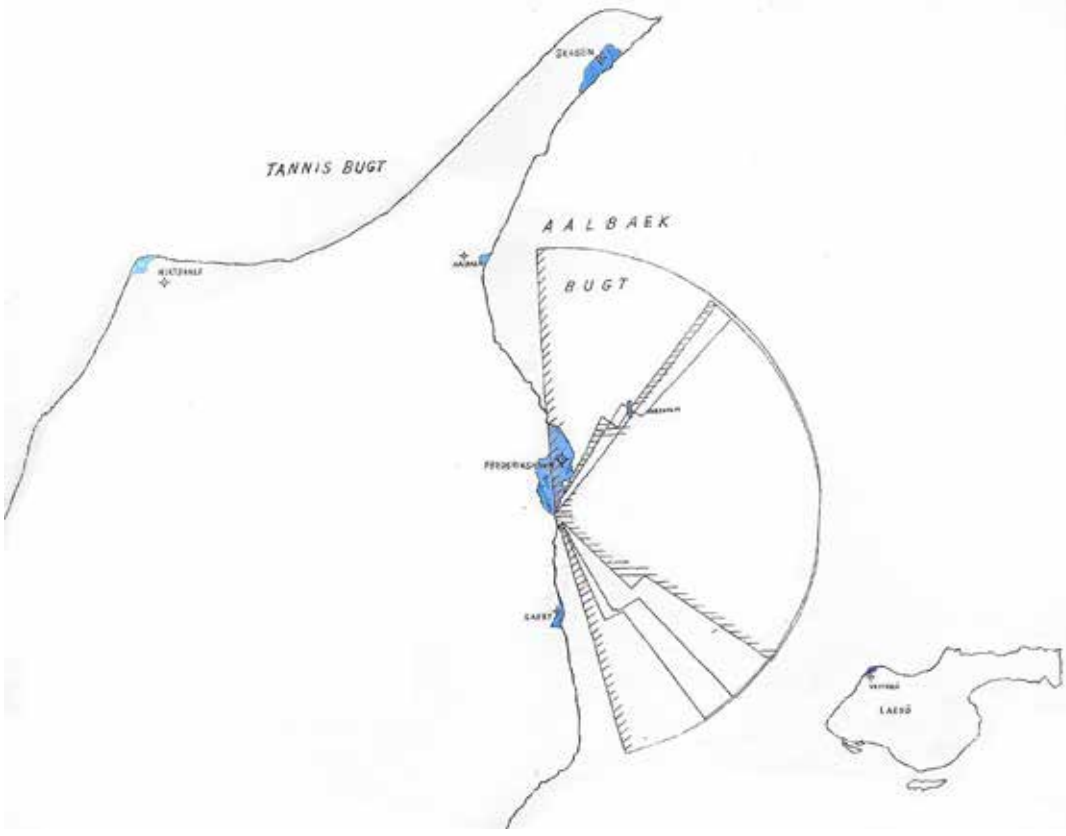


Illustration on wall of the Fire Control Bunker showing firing arc. Photo Robert Wood

construction work had been completed to allow the first two guns (numbers three and four) to be test-fired. The last two guns were test-fired on 28 August that same year. A two-storey fire control bunker, two large ammunition bunkers, a separate electricity supply bunker and four small bunkers for 3.7cm anti-aircraft guns were also constructed.

A 600mm narrow-gauge railway was laid to carry the heavy munitions, weighing anything between 495 kg and 800 kg, from the ammunition magazines and the gun emplacements. Each of the 38cm guns had a 90-man crew and with its full complement the installation was served by a detachment of up to six hundred men.

An enjoyable train ride

We started our visit with a trip round part of the site on this ammunition railway, and Sub Britters certainly enjoy a train ride! In 1991 the museum had re-established one km of the track using the original rails, but these were extremely worn, so by 1998 they were all replaced with new rails. The train ride takes approximately 13 minutes and travels through two bunkers, firstly through the upper floor of a two-storey ammunition bunker constructed of 3.5 m thick concrete. The second is the westernmost 38cm gun bunker.

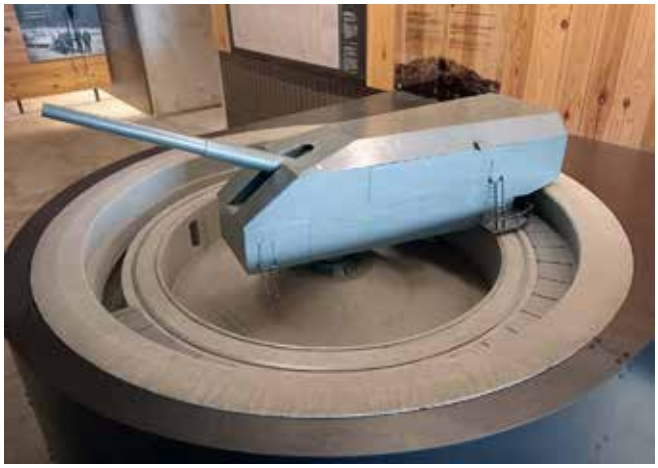
Trainspotters! The ammunition train heading out from its shed. Photo Sharon Brown

Robert Wood checking the gauge of the track. Photo Sharon Brown

Within the museum and shop complex is access to the bunker for Gun number three. It consists of around 35 rooms of which 28 would have originally been used as barracks and workspaces with the remainder for the ammunition, then the large gun pit. The turret was a huge iron casting, with the rear being supported by the ring wall around the gun pit.

The whole structure weighed approximately 350 tons, with the barrel (which would be covered by camouflage) alone being 19m long and weighing 110 tons. There are exhibitions of the living and working conditions, along with exhibits and descriptions of the ammunition hoists and their workings.

The gun pit of gun number three. Photo Sharon Brown



A representation of how the gun would have looked and worked. Photo Robert Wood

There are three circular hiking trails around the museum, which are interconnected and take in most of the visible bunkers situated on the site including the searchlight position, anti-aircraft and fire control bunkers, mortar positions and observation posts with explanation boards scattered throughout.

Vigso Beach coastal battery

Once back on the coach we were taken on a short tour of the town to see a couple of cupolas that still exist in the area before enjoying a short hop down the road to Vigso Beach, which we considered to be an ‘extra’ as it was not mentioned on the joining instructions sent out prior to the trip.

The gun battery at Vigso was built in 1941 as part of the Atlantic Wall, and was positioned in the first row of dunes to protect the right flank of the battery at Hanstholm. Initially, four 105mm guns were placed in open stands with the crews stationed in barracks, but later in 1942 the German army built protective bunkers.

Once all the work was completed the area consisted of bunkers for the guns, several for the crews, a fire control, two ammunition magazines and anti-aircraft positions. The manning of the battery would be two officers, 20 sergeants and 80 privates, along with 32 Danish workmen for other tasks.

On arrival at the beach, we scrambled to the top of the dunes, where we were confronted with the spectacular sight of the ruined bunkers lying haphazardly on the beach and in the water, having been stripped of their foundations by coastal erosion. The beach is popular with bathers, and it appears the bunkers have a new purpose – they are regularly used as changing rooms – as one of our party inadvertently found out during explorations!

The consensus was that this final stop of our Jutland Study Weekend was certainly well worth the visit.

Sub Brit heads to the beach. Photo Sharon Brown

Appreciation

All that remains is to say thankyou to Lars Hansson, and everyone involved, for the hard work in organising the trip and making it such a success. Also to Linda Dixon, Tony Radstone and Tim Wellburn who managed much of the logistics but were unable to attend the weekend itself.

Looking across the beach and the moribund blockhouses. Photo Sharon Brown

Sub Brit Explores Wemyss Caves, Scotland

Caroline Derry

View of the Firth of Forth from Wemyss Caves. The sea wall was damaged in 1992

East Wemyss, Fife, is a former coal mining village on the Firth of Forth. The nearby Michael Cole Pit was Scotland's largest before it closed in 1967, following a tragic underground fire. Today, the focus of the area's underground heritage is the collection of coastal caves that gave the community its name (Wemyss – pronounced 'Weemss' – is derived from 'uamh', the Gaelic for cave). Carved out by the action of the sea, the caves' walls guard a unique and world-class collection of ancient carvings.

Wemyss Caves were formed between 5,000 and 8,000 years ago and have been used by humans for at least four millennia. They have legal protection, as scheduled ancient monuments, but continue to be threatened by both people and nature.

Several caves on the other side of the village have already been lost to mining activity: in 1901, Glass Cave collapsed due to seams being worked underneath, while Michael Cave was filled with concrete in 1929 to enable a boiler to be installed above. In front of the surviving caves, the coastline is being eroded by the action of the sea, combined with subsidence following the closure of the mines.

In Pictish times the cave entrances stood behind a stretch of cultivated coastal plain, and as recently as 1795 they were about 100 yards behind the high water mark. Now they are on or near the edge of the coast and the waves come closer every year.

A sea wall constructed in the 1980s was partly destroyed by the sea in 1992 and the coastal path has been washed away.

Constant risk

Other damage has been caused by human activity. The caves have been used for gatherings of all sorts, some dubious, and have experienced both accidental damage and deliberate vandalism. Jonathan's Cave also suffered damage including the destruction of a swan carving when a stolen car was driven in and set on fire.

Gate protecting a cave entrance

Today, the caves are looked after by the volunteers of Save Wemyss Ancient Caves Society (SWACS). Among their work to care for this precious heritage, they have protected the caves from many human threats by installing new gates whose bars are cleverly twisted to form images relevant to the caves behind.

Largest collection of carvings

The caves' greatest treasures are their many Pictish carvings, the largest collection found in one place. While there are older decorations from the Bronze Age, the Picts used and decorated these caves from about 1,500 years ago. The Picts inhabited north and east Scotland from the late Roman period to the tenth century, although most of our knowledge about them comes from what others wrote.

Pictish carving of a boat, possibly a Viking longboat, in the wall of Jonathan's Cave

Their imagery is not well understood, but represents a complex system of symbols, many of which are visible in the caves. Carvings also show animals and a boat, the oldest carving of a ship in Scotland. It may represent a Viking longboat. If so, it was made between 800–900 CE. Other symbols have been dated by a 2019 archaeological investigation by the SCAPE Trust, University of St Andrews, to 250–400 CE.

The carvings have helped make the caves famous, and they were featured in an episode of the *Time Team* TV programme in 2004, as well as a BBC ident clip showing cavers with headlamps in one of the caves.

Pictish carving of a double crescent

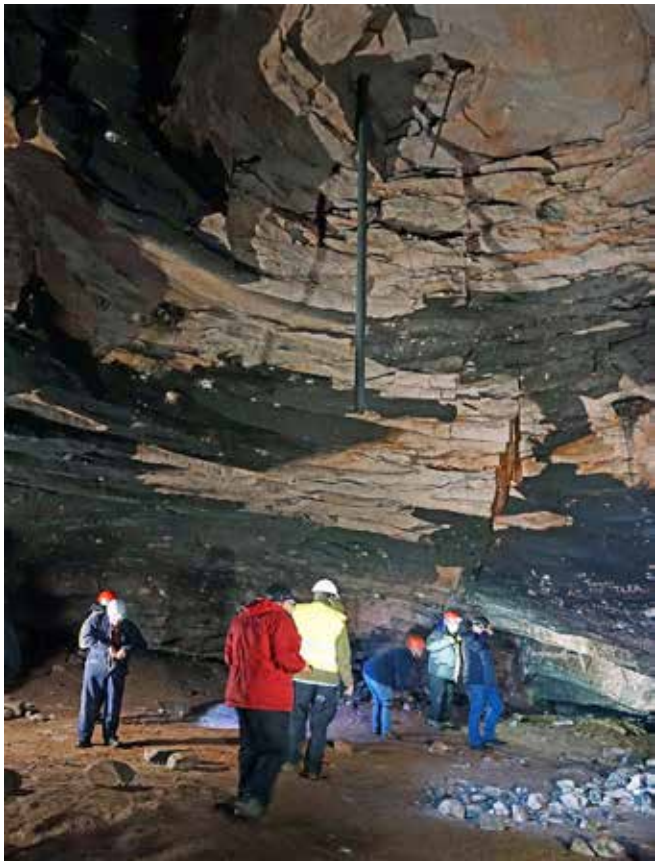
Sub Brit arrives

In October 2022, following the Edinburgh study weekend, a cluster of members of Sub Brit arrived to visit the network of caves. After a walk past the ruins of Macduff Castle they were taken through the gates by volunteer guides from SWACS.

The visitors divided into two groups. Those happy to take a more awkward route crawled through a five-metre passage into Well Cave, the only one not open from the outside. The cave's name refers to a well which used to be at the back of the cave until coal mining changed the water table.

At the entrance to Well Cave

The water which bubbled up was drunk on the first Monday of the new year, known as Handsel Monday. (When Scotland moved from the Julian to the Gregorian calendar, this became the first Monday after 11 January.)



Inside the large domed interior of Well Cave. The pipe descending from the roof was probably placed there as part of a plan to fill it with concrete

Following a torchlight procession from the village, a religious ceremony was held at the well and hymns were sung, followed by the exchanging of gifts and a party. Offering someone a drink from the well was considered a statement of romantic intent. The event died out at the end of the nineteenth century.

The cave interior is twenty metres long, with a domed roof reaching up to ten metres in height. While Well Cave does not have Pictish carvings, it does have more modern graffiti, including the names of four 'Bevin boys' who, during World War II, contributed to the war effort as coalminers.

Eighteenth-century and Victorian visitors also left their marks, with some names and dates elaborately carved. More recently, Well Cave has been closed to the public as there have been rock falls over the years. Concerns about its stability led to a plan to fill it with concrete. Happily, this proved unnecessary, but a tube in the roof is probably a legacy of that plan.

Graffiti left by four 'Bevin Boys', identified only by their initials. Named after Ernest Bevin, Minister of Labour, Bevin Boys were conscripted between 1943 and 1948

Victorian graffiti, Well Cave

Secret passage?

There are rumours of a secret passage between this cave and Macduff Castle above. A possible passage does lead out of the cave, but is blocked after about fifteen metres. Unfortunately, if it is in fact a tunnel to the castle then it would have come out under a tower demolished in 1967 due to safety fears. The answer is therefore buried under tons of rubble, although in his guide to the Caves, Frank Rankin records that local people remember steps leading down from the tower.

The castle's other tower does survive, along with some of the outer wall. Although named for Clan Macduff, who were Earls of Fife until the fourteenth century, the current castle was actually built by the Wemyss family and extended by the Colville family – before the Wemyss family bought it back in 1630. By the eighteenth century it was no longer inhabited.

Pictish carving of a floreated rod with double disc, probably a symbol of authority

Part of the remaining tower of Macduff Castle

Jonathan's Cave is named after a former resident, an eighteenth-century nail-maker. Along with several Pictish carvings including the famous longboat, the cave has nineteen early Christian crosses which has led to speculation that it may have served as a church.

One of nineteen early Christian crosses in Jonathan's Cave

Pigeon pie

The groups also walked past Doo Cave, formerly used as a dovecote. Nesting boxes were carved into its walls for pigeons which provided a source of meat during winter. The cave was later replaced by a purpose-built circular dovecote on the coast edge, which no longer survives. Also gone is West Doo Cave, originally joined to Doo Cave. It collapsed in 1914 thanks to a heavy gun emplacement on top.

The entrance to Court Cave, with one of five brick pillars built in 1934

Both groups met again in the large Court Cave. This was used as the local Baron's court in the Middle Ages, with the court summoned by a bell at the cave mouth. The cave front, before a collapse in the 1970s, used to bear the marks of a bell rope.

The cave itself was protected from the risk of collapse caused by mining works by five brick pillars, added in 1934 by the Wemyss Coal Company. Their miners used to play Toss, a gambling game, in the cave. Inside are a number of Pictish carvings, including a possible image of Thor with his hammer and a sacred goat.

Knowledgeable SWACS guides shared the history and interesting details of the caves with Sub Brit visitors. They also run regular public tours

Carving in Court Cave passage which depicts a figure, possibly the Viking god Thor carrying a hammer, and an animal which may be his sacred goat

Spreading the word

Our visit ended away from the sea front, in the Education Centre run by SWACS. They offer displays about the caves and their history and sell a range of publications as well as hot drinks and souvenirs. SWACS, in collaboration with the SCAPE Trust, has also used digital technology in a major project to create and share 3D scans of the caves.

The project was funded by the Heritage Lottery Fund, Historic Environment Scotland and Fife Council. Its images, which record every carving as well as the caves and coast themselves, are available on the Wemyss Caves 4D website which also has explanatory videos and text.

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Save Wemyss Ancient Caves Society https://wemysscaves.org/

Wemyss Caves 4D http://4dwemysscaves.org/

All photographs by the author.

Sub Brit Visit to Windsor Castle, March 2023

Tim Wellburn

Henry VIII's 1511 Gateway to Windsor Castle

On a rare day of glorious March sunshine, and having successfully negotiated the armed police picket, we were granted access to Windsor Castle, passing through Henry VIII's imposing gateway into the Lower Ward. The freehold of this area – accounting for about a quarter of Windsor Castle – is held by the College of St.George, not by the Crown. Most of what we were about to visit is off the main tourist route but as the Castle was closed to visitors we felt especially privileged.

We had two main objectives: the Curfew Tower with its hidden surprises, and St George's Chapel. Both of these were described in detail in Martin Dixon's article "Underground Windsor", published in *Subterranea* Issue 58 (December 2021). I will try not to repeat information given in this, beyond that which is necessary to describe our visit.

We were welcomed by Commander Charlotte Manley, LVO, OBE, the Chapter Clerk of St George's Chapel, who had arranged our visit with Martin, and had generously given up her afternoon in order to show us some of the Castle's historic buildings and structures.

Cmdr Manley briefs Sub Brit: in this instance, on the constraints and pitfalls of bellringing in the Curfew Tower

Kindly assisting her, and ensuring none of our party went astray, was Colonel Barrie Fairman, OBE, one of the twelve Military Knights who serve the monarch and the Order of the Garter, and who is a resident of the Lower Ward. We recognised that we were seriously out-ranked!

The Curfew Tower

The Curfew Tower and curtain wall running SSE towards the Garter Tower. Spot the small iron grille of the Ventilating Eye

The Curfew (or Clewer) Tower dates from 1227-30, being part of the new defences built following a siege during King John's reign. However, when viewed from outside, it is of largely Victorian aspect having been thoroughly worked over in 1863 by Anthony Salvin. Salvin, who had previously repaired or 'restored' a number of castles, encased the existing tower in Reigate stone, raised its height and added a large semi-conical roof. The latter was said to have been inspired by Emperor Napoleon III's suggestion to Queen Victoria that the Tour du Trésau, on the eastern circuit of Carcassonne's inner walls (and itself heavily restored by the French architect Viollet-le-Duc) would be a good model.

Not the Curfew Tower! The restored Tour de Trésau, Carcassonne, on which the reworked Curfew Tower was probably modelled, whether or not at the French Emperor's suggestion

We descended a flight of steps to enter the tower's basement through an original archway. We found ourselves in a large (22ft x 32ft) stone-vaulted room. In plan form, the far (external) end of this room was semi-hexagonal, opening onto five small casemates or embrasures, pierced by arrow slits. The explanation for this apparent incongruity is that the 'basement' is, in fact some 30 feet above external ground level because the Curfew Tower was built in the Norman ditch of the Lower Ward.

Sub Brit – captivated in listening mode in the Curfew Tower dungeon

This room is generally known as the "Dungeon", although its original and main function would undoubtedly have been as a storeroom. However, Cmdr Manley informed us that, during the Civil War, it was indeed used as a prison, accommodating between 20 and 165 detainees at any one time during the first 16 months of the conflict. At anything approaching the latter complement, the over-crowding and living conditions must have been particularly unpleasant.

Sub Brit – released from the dungeon

Whilst Salvin transformed the external appearance of the tower, his was not the first radical intervention. As part of a major reconstruction programme of St George's Chapel, instigated in 1477 by Edward IV, the College of St.George decided to move the Chapel belfry from the

purpose-built 1359 Mary Tudor Tower (now the home of the Governor of the Military Knights of Windsor) to the Curfew Tower. This required a new bell-cage to be constructed. To support this, a massive timber structure, over 50 ft high, had to be built within the tower. The bell chamber itself rose above the parapet in the form of a two-storey square tower surmounted by a cupola, all now enveloped by Salvin's gable roof.

Part of the massive oak structure, built in the late 15th century, within the Curfew Tower to support the bell-cage. We did not continue up into the bell loft which is accessed by these ladders

Perhaps these works exceeded the funding available, because the curious decision was taken to purchase the clock second-hand from Windsor Parish Church. This proved a false economy and it was replaced with a new one in 1490. This lasted until 1689 when the present timepiece, engraved JOHN DAVIS WINDSOR 1689, was installed. This has remained in service to this day, but one is not recommended to try to catch a train in accordance with its slightly idiosyncratic interpretation of time.

The third generation clock, dating from 1689. In a nod to modernity, and to save the clock keeper from having repeatedly to ascend the tower, it is now wound automatically

We climbed a worn but substantial wooden staircase to the ringing floor. This space was unusually, and awkwardly, restricted by the massive oak timbers of the internal framing and by ladders leading up to the bell loft and its eight bells, two of which each weigh over a ton. The cramped space requires, exceptionally, that the bells be rung anti-clockwise. Nonetheless, a full peal (which takes around three hours) is attempted on major occasions such as Royal Jubilees. Cmdr Manley told us that, if the bellringers make a single mistake, the peal is abandoned. She provides champagne or beer to celebrate, respectively, success or failure. Full peals are recorded on plaques. You will not find one for the Platinum Jubilee: they reached 2 hours 10 minutes before an error terminated in beer and commiserations.

THE BELLS OF THE CURFEW TOWER.

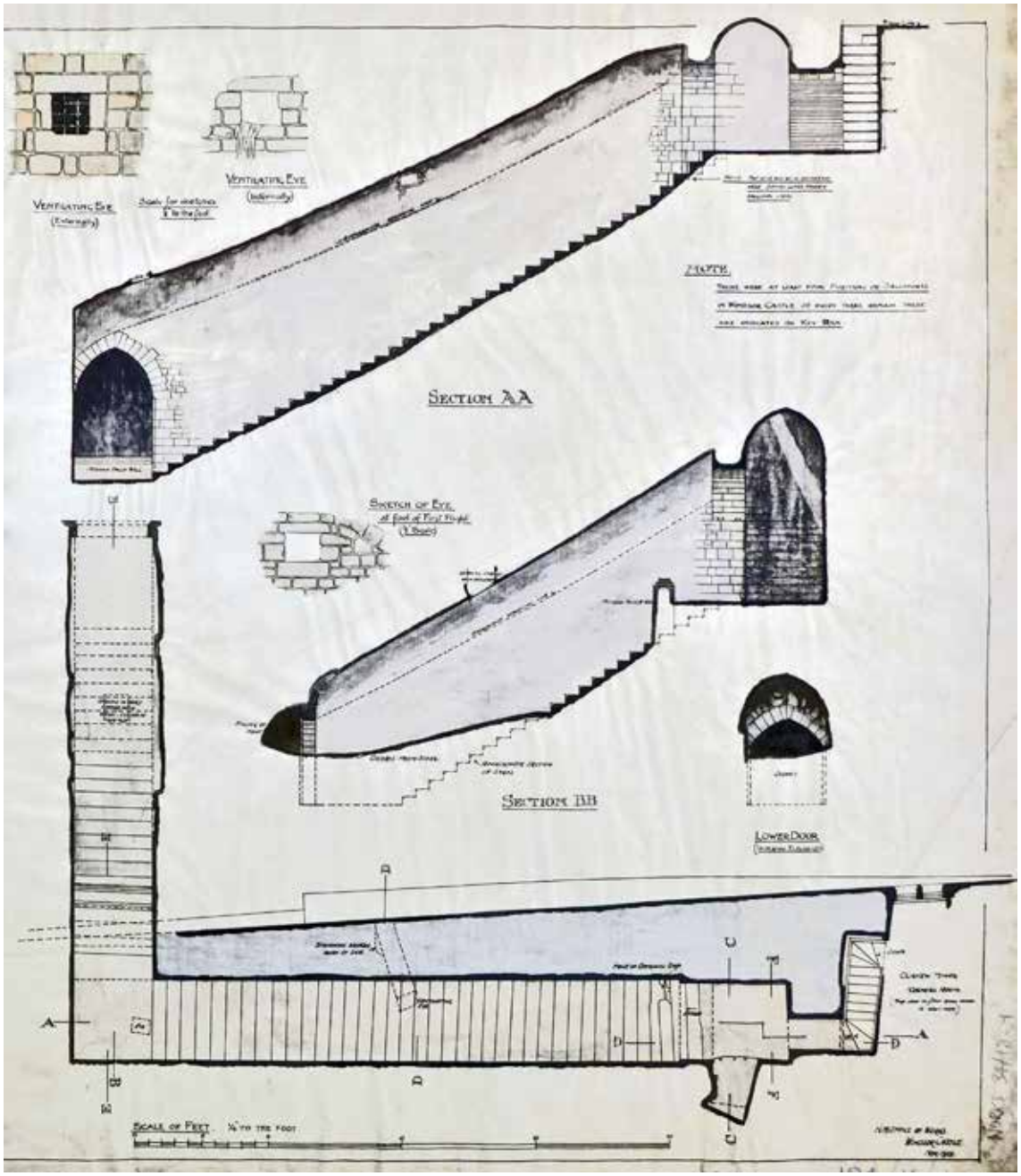
BELL N°	DATE CAST	INSCRIPTION	DIAMETER	WEIGHT
1	20 Feb 1741		31½ 800	6½-331
2	1650		32 813	7½-387
3	1650		34½ 876	8-408
4	1612		36½ 927	9½-485
5	1898		41½ 1048	13½-689
6	1615		44 1117	14-714
7	1612		48 1219	20 1-02
8	1614		52 1321	26 1-33

The particulars of the current set of bells. As is evident from the casting dates, none of the original 14th-century bells survived beyond the 17th century

A defended bell tower!

A curiosity of the ringing floor is a 1544 smooth bore cannon, mounted on an unusual land carriage, and aimed at the bridge between Windsor and Eton. It must have taken some considerable effort to manoeuvre this piece into position, but it is not known at what point in antiquity – or why – it was emplaced here.

The Sally Port



Part of the 1919 Plan of the Sally Port showing the two flights of steps and details of the Ventilating Eye. The National Archives, Work 34/1829

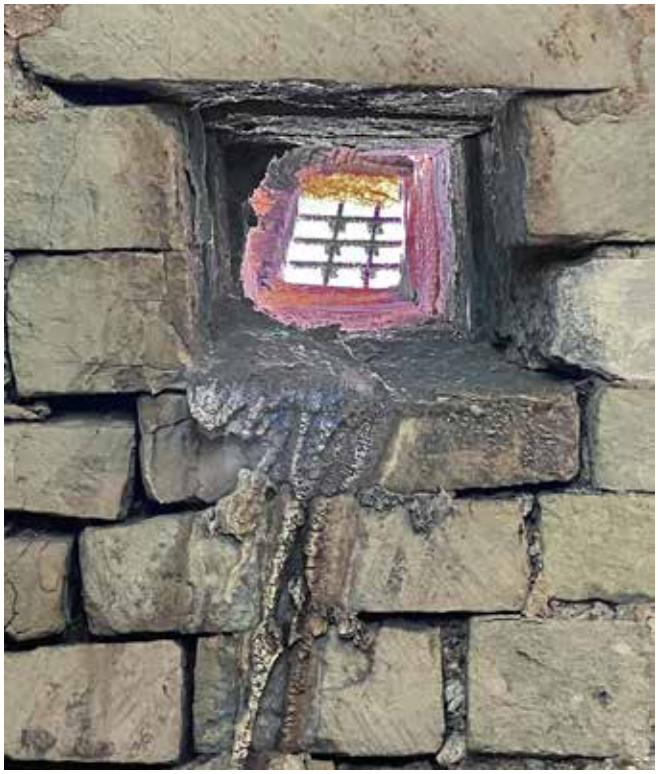
We now moved towards the subterranean highlight of our visit. Passing through a door bearing the notice: "*Access to the Sally Port only permitted if authorised by the Clerk Of Works, the Chapter Clerk or the Consultant Archaeologist*", the second of these august personages, having done just that, lifted a trapdoor revealing some rather incongruous concrete steps. At the bottom of these we stepped through an archway and back through time to the head of an ancient and extremely dilapidated flight of about 40 stone steps. These ran within, and roughly parallel to, the face of the curtain wall, disappearing down into darkness which the temperamental electric lighting was loath to illuminate – but Sub Brit torches quickly banished.

A small landing, at the foot of this flight, merely changed the direction of the steps 90^0 to the right. Accumulated debris has long since buried the lower part of this second flight, so headroom diminishes until the point where the passageway has been deliberately blocked. Only the top of a stone archway indicates that the tunnel once continued under the ditch. This truncation was recorded similarly in the plans drawn by HM Office of Works, Windsor Castle, in November 1919.

The Sally Port: the first flight of steps within the curtain wall of the Castle

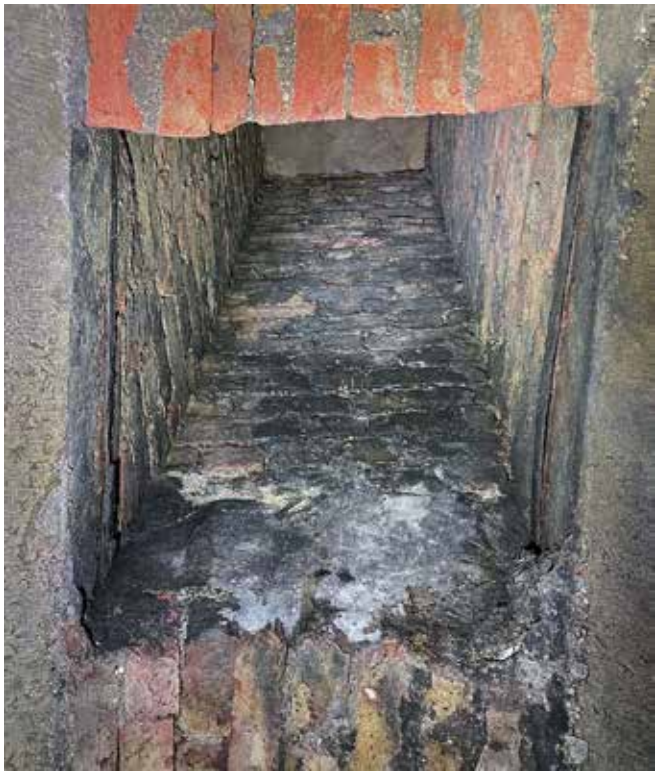
No light at the end of the tunnel. The rest of the flight of steps is lost in the debris/backfill which almost obscures the archway and former tunnel beyond.
Note the (blocked) brick opening in the roof vault

Martin Dixon's article drew attention to the "Ventilating Eye", illustrated on the 1919 plans and still visible – to the knowing eye – in the curtain wall south of the Curfew Tower. We were gratified to see this 'eye' from within the sally port, a square shaft, set high up, running through the thickness of the outer wall.



Sunlight penetrates the grille of the ventilating eye, viewed from within the sally port

In fact, there is a second opening, vertical and rather larger, in the vault of the lower stairway. This is brick-built and capped after some 20 brick courses by a stone slab. If excavated, it would presumably open somewhere at the foot of the curtain wall in the grass slope outside the Castle.



The blocked shaft in the vaulting above the second flight of steps

Cmdr Manley told us that, in former times, the residents of the Lower Ward were wont to use the sally port as a convenient way of going out for a convivial evening in town. One can only speculate how many failed safely to negotiate the dark and treacherous flights of steps on their return.

Revellers return to the castle through the trap door of the sally port

St George's Chapel

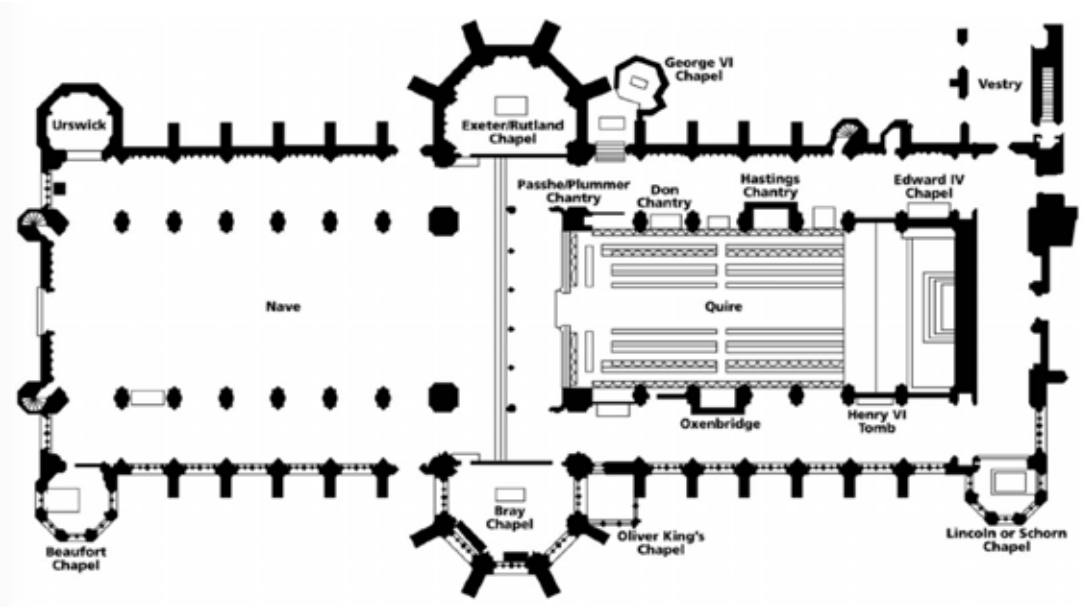
St.George's Chapel, Windsor

As noted, Edward IV initiated a major reconstruction of St George's Chapel, work which was continued over the next 50 years under Henry VII and Henry VIII. Built in late medieval Perpendicular Gothic style, the Chapel's fan- and lierne roof vaulting is spectacular. We were asked not to take photographs in this area, so the illustration here is taken from Wikimedia. We were also able to pay our respects at the final resting place of Queen Elizabeth II in the King George VI Memorial Chapel. The ledger stone is inscribed: George VI 1895-1952; Elizabeth 1900-2002; Elizabeth II 1926-2022; and Philip 1921-2021.

St George's Chapel: the spectacular stone roof vaulting, with the Garter banners on either side.
Photo: Josep Renalias, Wikimedia, reproduced under Creative Commons Attribution-Share Alike 3.0

We were told about other Royal interments in St George's Chapel: these were itemised in Martin Dixon's article and are not repeated here. However, we were informed that the ledger stone laid on the instructions of William IV to mark the vault curiously shared by Henry VIII and Charles I, is actually misplaced and should be much closer to the top of the catafalque to the Royal Crypt. Access to the latter is restricted to the King and just three office holders, so that was as close to it as we got.

From here we ascended to the upper storey of Edward IV's Chantry Chapel, used by Queen Victoria to



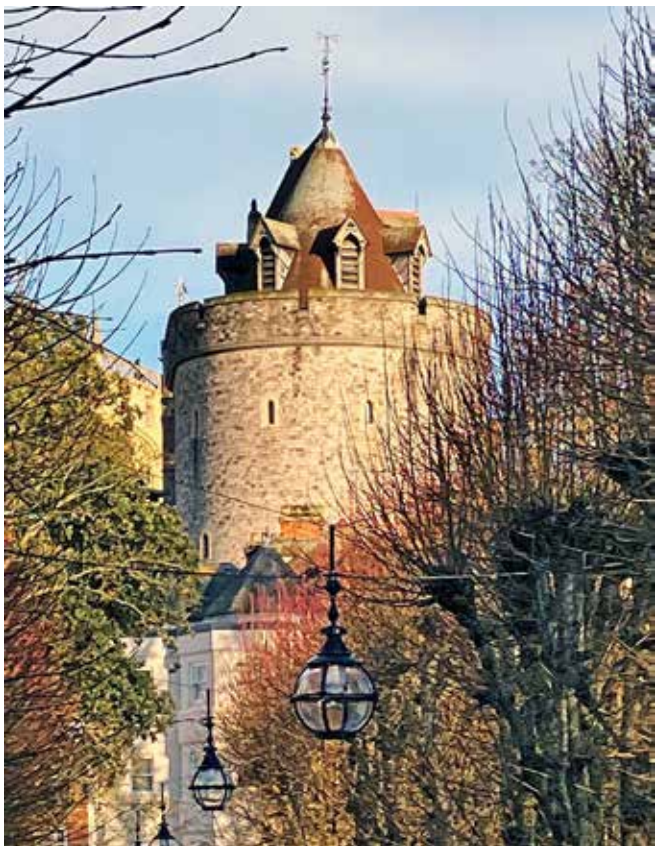
Plan of St George's Chapel showing the locations of the George VI and Edward IV Chantry Chapels. From "The Chantries and Chantry Chapels of St George's Chapel, Windsor Castle", Cindy Wood, University of Winchester, 2004

participate discreetly in services in St George's. Cmdr Manley then led us out of a doorway onto a narrow roof-walk, which was the surprising and somewhat vertiginous route taken by Queen Victoria to reach the Chapel. The very low balustrade remains a silent witness to her diminutive stature.

Finally, we visited the Chapter Room – the headquarters of the Dean's domain – and the adjacent stone-vaulted Aerary, which has served as the College's strong room for important documents such as charters and land deeds, since 1353. Sets of 'filing' drawers built-in along three of the walls are still in use, although the archivist was finally permitted to move to less austere accommodation in 1988.

This concluded our splendid visit to Windsor Castle, although several members returned a little later to attend Choral Evensong in the Chapel. We are very grateful to Commander Charlotte Manley, LVO, OBE, Chapter Clerk of St George's Chapel, not only for acceding to Martin Dixon's request that Subterranea Britannica be allowed to venture into some historic and rarely seen areas of the Castle, but also for giving up so much of her time to guide us round, as did Colonel Barrie Fairman, OBE.

All photographs are by the author (regrettably only taken on an iPhone), unless indicated otherwise.



Early evening sunshine on the Curfew Tower, viewed from the town

Invitation to Visit the Mid-England Barrow

Members who attended the AGM and Spring Meeting in 2022 will remember the excellent talk given to us by Sarah from the Mid-England Barrow about the UK's newest repository for funeral ashes.

Sarah has now extended an invitation to all Sub Brit members to come along and visit the site, near Banbury at OX17 1FA. In addition to a variety of open days, charity mornings and events for the public, members can contact Sarah to arrange a personal visit at other times when in the area.

Mid-England Barrow, in the heart of English countryside in Oxfordshire, close to the borders with Warwickshire and Northamptonshire, is an amazing structure created entirely from natural resources, designed and built by skilled local craftsmen.

Niches, nestled into the walls, offer spaces for up to five urns (sets of ashes) which are then secured by completely personalised covers, made from stone, glass or other material, sourced from local craftsmen and women.

Further information

www.mid-englandbarrow.co.uk

Norwegian Guns and WWII Bunkers

Stewart Owers

This is what you could have won. One of the remaining 40.6cm guns located at the 'concrete battleship', Harstad. *On the recent study weekend to Denmark a similar site was visited but the turrets were missing. Photo Dave Maguire*

In the Second World War, Hitler's obsession with Norway was primarily to maintain access to the Narvik iron ore terminal, and to use its coastline to harbour the German Navy's submarines and battleships, as in the First World War these had been confined to the North Sea.

Before the war, as a neutral country, Norway had minimised its military budget, and in May 1941 became a victim of the four-pronged German attack on Oslo, Bergen, Trondheim and Narvik.

The consequence of the invasion was that the Germans built an overlapping series of coastal forts and airfields from the Baltic to the Barents Sea, using an assortment of armaments from the captured Norwegian forces, weapons confiscated from other overrun countries and, later, heavy guns from redundant battleships.

It is also worth mentioning that the loss of the majority of their destroyers to the British navy at the battle for Narvik left the German navy short of the destroyers needed to protect its troopships for a planned invasion of Britain.

221 batteries built and manned

Including the existing Norwegian fortifications protecting the four main harbours, 221 batteries were built and manned throughout the war, usually on remote headlands, under both naval and army commands, with an assortment of guns and ammunition. At the end of the war none of these principal batteries had fired a shot in anger, but had tied down 400,000 troops over the five years.

Manpower losses, however, were huge, but all of them amongst the Yugoslav and Russian prisoners or slaves used in Arctic conditions to construct the fortifications, railways, tunnels and ammunition bunkers.

In order to reinforce Hitler's judgement that an invasion of Norway was probable, sporadic British raids and covert operations were made, in order to tie down as many forces as possible.

Defensive potential

At the end of the war, the Norwegian army destroyed many of these emplacements, but sites offering defensive

capability for the major ports were retained under NATO command until 1994. Some are now open for promoting tourism; others, beyond the reach of scrap merchants, remain for investigation by curious Sub Brit members.

For this DIY tour of Norway's recent past all you need is a small car, a tent, a tolerant companion, good walking shoes, endurance, and a camera. Beware of using an electric car as the distances are significant and often visiting remote headlands will add an additional 100km from the main road.

This trip was from Trondheim to Narvik airports, and probably covered 1,500km. Alcohol is prohibited for drivers so it is an ideal vacation for trials of abstinence. This too will fail.

Submarine pens, Dora 1, Trondheim. Photo Dave Maguire

First stop Trondheim, where the submarine pen, Dora 1, remains intact under the National Archive office above. As Trondheim Fjord was the naval base for both the *Bismarck* and *Tirpitz* warships, it was accorded exceptional protection from a seaborne attack.

Visited in turn were the coastal batteries at Austrått , Brettingnes and Hysnes, but escape from Trondheim is by the extensive road tunnel system, which with a ferry to Austrått to catch, was no time to get lost. Failed again.

The Triple 283mm Turret at Astratt. Photo Stewart Owers

The Austrått battery on the Orland peninsula was specifically constructed to house the three-gun turret from the battleship *Gneisenau*, which was bombed in dry dock after successfully completing its famous Channel dash in February 1942, then dismantled.

Austrått was commissioned a year later in 1943, which was a logistical achievement itself, to construct the magazines, munitions railway, accommodation, tunnels, and shaft required for the turret, so quickly in wartime.

The Rangefinder was also from the Gneisenau. *Photo Dave Maguire*

Triple turret guns

The triple turret guns, 283mm, and munitions handling systems were removed from *Gneisenau* and transplanted in the vertical shaft, with no alteration … port and starboard, not east and west. The rangefinder was transferred to a hilltop south of the site, but now repositioned alongside the turret. It remains the most impressive of the remaining WWII gun emplacements in Europe.

Shell-handling equipment within the bunker below the turret. Photo Stewart Owers

Onward to the original Norwegian batteries of Brettingnes, with 2 x 21cm Armstrong, 3 x 15cm Armstrong guns; and Hysnes, with 2 x 21cm Armstrong, 2 x 15cm Armstrong, all set in single embrasures.

Brettingnes, on the north side of Trondheim Fjord, appears to have been maintained under NATO/Norwegian control until 1994. However, some of the Armstrong guns are still in position, but some of the iron gates to the original access tunnels are not. This combination, and

the natural instinct of Dave Maguire, led to exploration of this silent abandoned world.

Fire Control Bunker with 360 degree view ports and shutters. Brettingnes. Photo Dave Maguire

Armstrong gun turret in embrasure, Brettingnes. Photo Dave Maguire

The two accessible guns look complete, but the magazines and power supply are removed, so it is not just a WD40 job to reactivate. Navigating the partially demolished complex without a layout was unwise so we transferred to the adjacent hillside. There the equipment of the other guns and range-finding sites had been removed, but as interesting was the cast-iron observation post placed on the lowest bunker building, as these reappear in other German built bunkers further north, so were not part of the Norwegian installation.

Armstrong gun breech, Brettingnes. Photo Stewart Owers

Cast-iron observation post with sheet steel rangefinder housing. Photo Dave Maguire

Retreat in ignorance

Hysnes is a considerable complex adjacent to Brettingnes, and of similar size, but may not have been retained after the war as an active base. There was a closed museum which may have given access to the complex, but with no obvious sites of interest, we retreated in ignorance.

Further north we decided to deviate from the road to Namsos to the Utvorden-Süd fortifications on the south side of Namsenfjorden, a return trip of a mere 100km. The road ended at the western shore with no sign of any fortifications, but did have a map indicating that a short walk, in Norwegian terms, would be rewarded.

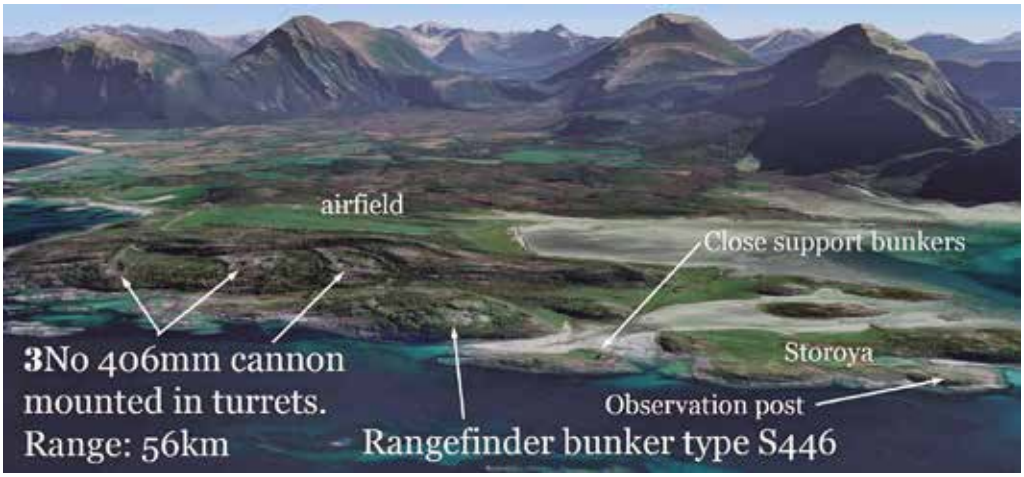
No track was visible so any fortification must have been built and supplied by sea. The map did not show that trees and shrubland would obscure any sites, but eventually we found the central rangefinder and control bunker.

Black void

A rusty ladder descended into a black void, tempting further investigation. It did not disappoint. The rock cavern was the size of a tennis court, the floor covered with timber detritus, and no sign that it had been entered for decades – no beer bottles or plastic containers, and no light. Presumably this was the messing facilities and accommodation for the control post.

Central rangefinder and control bunker, Utvorden-Süd. Photo Dave Maguire

This extraordinary site then unravelled. From the top of the bunker we could see gun barrels pointing skywards – the 6 x 150mm Schroder wheeled artillery, probably French, from WWI. Although the breeches had been blown, and the wheels decayed, it was clearly not commercially viable to remove them from this inaccessible site. It was truly a walk on the wild side.



Dietl battery. On the recent Sub Brit trip to Denmark a similar layout was seen at the Hanstholm battery. Also, the rangefinder and fire control bunker were identical in construction. Annotation by Dave Maguire. Landscape by Google Earth.

Schroder wheeled artillery. Photo Dave Maguire

Two other more open caverns were discovered, which were probably for stores and ammunition, and under the site of the radar position were concrete accommodation units. Sadly, we failed to find the 3 x 21cm Mrs site listed in the *Atlantikwall* guide, and only discovered later they were housed in an emplacement facing north over the fjord entrance, just another three kms away.

Logistical nightmare

These guns were in position from 1942 to 1945. With no road access, manning and supplying them must have been a nightmare. The guns would have been ineffective against shipping and openly exposed to aerial and naval firepower. It was never used and utterly pointless. However, as a tourist attraction it beats Disney World.

Dietl Battery and the protected fjord. Photo Stewart Owers

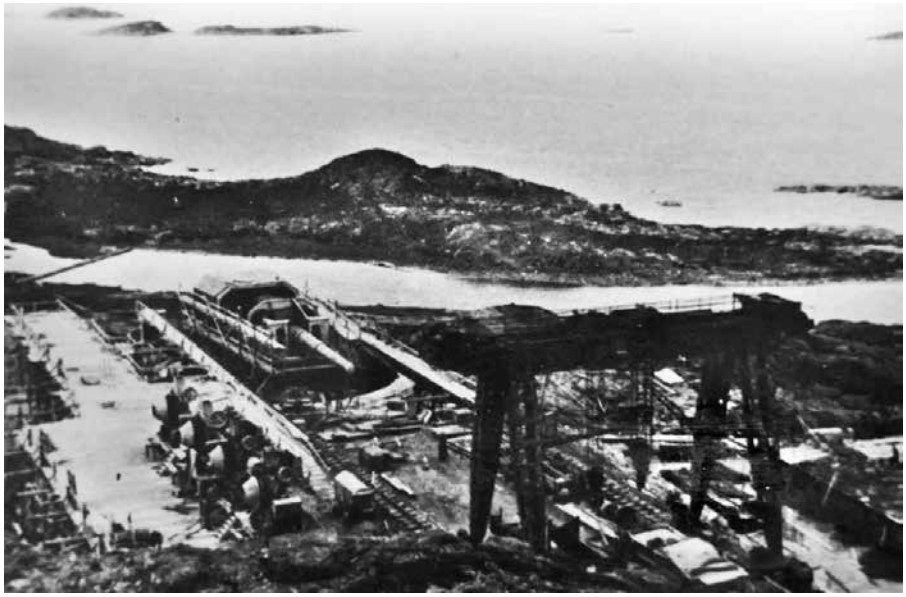
World's heaviest guns

The next relocation was to a campsite near to Engeløya, at the mouth of Narvik Fjord. On Engeløya is the Dietl battery, and one of the most amazing of the accessible sites. The three emplacements each had a single 40.6 cm SK C34, manufactured a decade earlier for installation on the H class battleships, that were never built.

These were the heaviest guns in the world and transporting them with the beach landing required show considerable skill. None of the guns remains at Dietl, but the generators remain, along with replica shells and an original rail loading trolley.

Gun emplacement. Photo Stewart Owers

Rangefinder position with observation cupola. Photo Dave Maguire



Unloading the 406mm gun in 1942

The site at the entrance to Narvik Fjord is spectacular, and all within the 56km range of the 40.6cm guns, but only one of the three is open to the public, although the site extends to the neighbouring islands. Near the guns is the accommodation block, with the lower tier left untouched by time, as it is flooded with Arctic water. At the expense of blue toes, this too was explored, photographed and rapidly vacated.

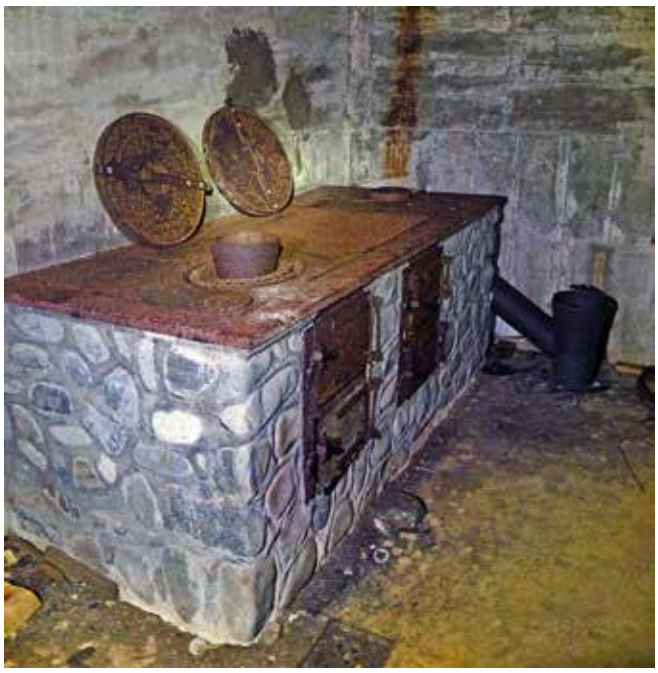
Observation post on Storøya. Photo Stewart Owers

At low tide there is access to the protective works on the adjacent island of Storøya with the fortified accommodation and a separate command post, and

Observation post on Storøya. Photo Stewart Owers

A-A gun positions. Another auxiliary command post with fully serviced accommodation can be inspected. Again a two-level bunker, but this time with the accommodation, kitchen, and observation posts at the upper level.

Inland from the battery is a small runway and other bunkers, and further still the workers' campsite. The whole site must be one of the most integrated WWII sites in Europe, and has its own small staffed museum. The trip is amplified by driving through the 8km Steigen road tunnel and heart-stopping bridge to Engeløya, at Bogen.



The heart of the Storøya bunker; the kitchen. Photo Dave Maguire

Bofors gun emplacement bunker, Lodingen. Currently used for secure storage; the roofs have also been felt covered. Photo Stewart Owers

On the Lofoten side of Narvik Fjord were a number of smaller batteries with the four Lodingen 30.5cm Bofors

being the most prominent. These installations were retained by NATO and seem to have been modernised from their WWII origins, as they were first commissioned in 1941.

There is no access to any emplacement, but a large door in the nearby quarry suggests there is a connecting tunnel. The siting is majestic, with unimpeded views to the south. Further down the fjord there is another small gun site, and behind it, recessed into the bank is a long-forgotten command bunker.

Command Bunker entrance. Photo Stewart Owers

Lucky hit

The heavy steel door on the catering block of the Tjeld Bridge campsite was a continuation of this time warp, another refurbished WWII bunker. This was the base of the final trip to the Harstad operational 40.6cm H Class battleship gun within a Norwegian military area. The site is clearly a sanitised version of Dietl, but impressive nevertheless.

In common with Dielt the site is low-lying, so the rangefinder must have been somewhere on a nearby hill, as the shell had a range of 56km. Even with subsequent radar, it would have been a lucky hit. Pictures cannot do justice to the size of this weapon, and with the cartridge required to deliver the shell, it would take a brave but deaf gunner to pull the trigger (see first photo).

Last task

Job done… one task remained, collecting the oceanic refrigerant for the beer.

Not sure if he's waving hello or goodbye.

A Coal Mine at Cobham near Gravesend, Kent

Rod LeGear MCIfA

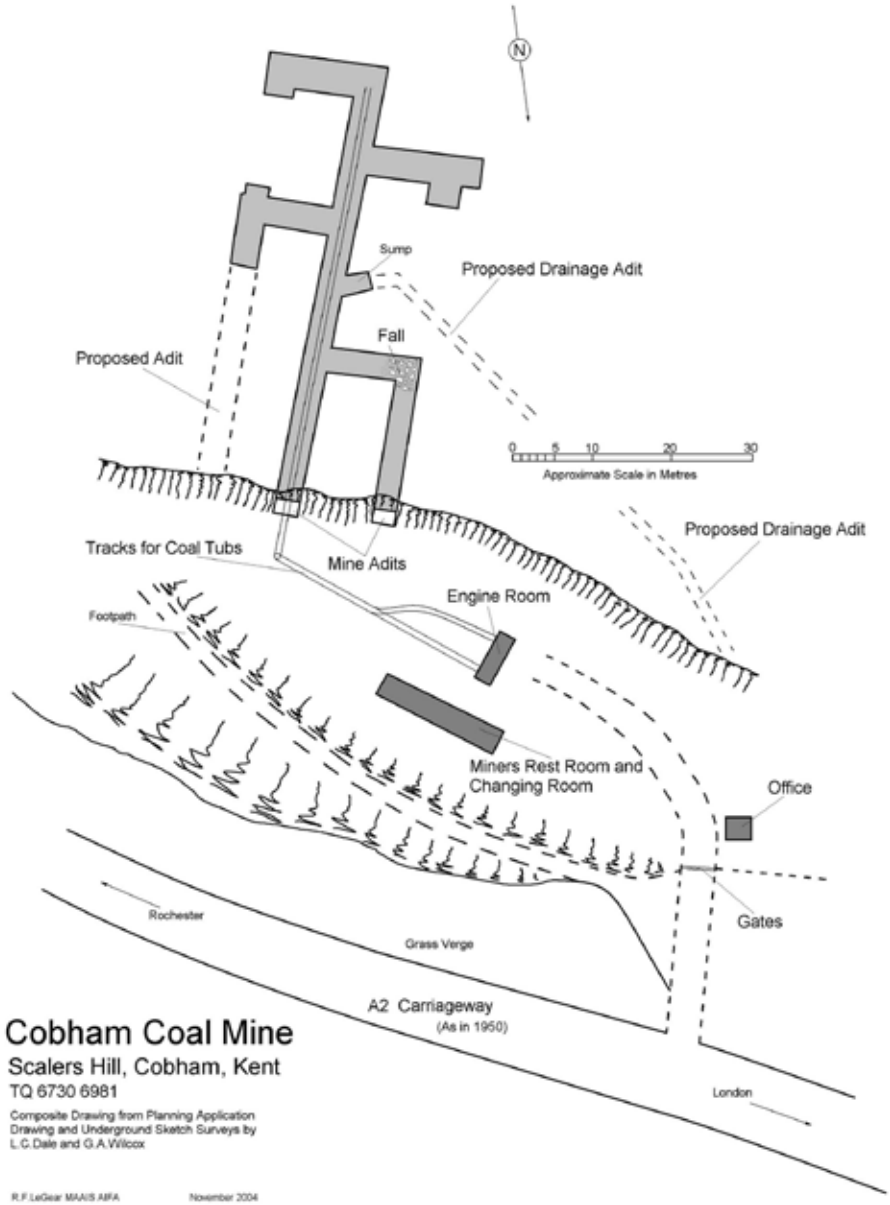
Miners working in the eastern gallery at Scalers Hill shortly after the mine opened in 1948. Note the very heavy timbering that was required throughout the workings

A coal mine at Cobham – you must be joking! Actually no, there was indeed a coal mine at Cobham just south of the A2 near the 'Inn on the Lake' hotel.

Lignite (a brown form of coal) was first noted when members of the Geologists Association had an excursion to the area to examine a cutting being made for the new arterial road (the A2) in September 1922. The geological section exposed showed a thin layer of Lignite in the Woolwich and Reading Beds. It was seen to be thickening as the section deepened from 6 inches at the surface to 2ft 6in at its lowest exposure. A sample was sent off for analysis and was found to give 8,525 British Thermal Units per pound, well below the 13,900 BTU from a good bituminous coal.

The story then moves on to 1947 when Tom Wallis, an ex mining engineer who was at the time employed as a commercial traveller, noticed that rain water running down the hillside was black, which indicated to him the presence of coal. In December 1947 he went into business with Leon Franchel, a Rochester café owner and Mr E.A. Morling, a Maidstone solicitor, to form the Cobham (Kent) Mining Company. The company obtained mining rights over an extensive area and as well as coal also had the right to prospect for and excavate: Gypsum, Fire Clay, Blue Clay, and Fuller's Earth, Lignite, Peat, Greensand and Yellow Ochre. Mr Wallis was the company's Technical Director and Mine Manager who was totally convinced that there was a seam which would yield at least 10 million tons of good household coal.

The newly formed National Coal Board sent along its Regional Controller together with a mining engineer and a Divisional Chief Scientist to visit the site of the new venture. They thought the claims were extremely optimistic but gave the company authority to continue



as a privately operated mine as long as they employed no more than 30 men. In fact employment figures never approached that figure. In the 'List of Mines in Great Britain' published by the Ministry of Fuel and Power in 1950, the number of persons employed was given as only four underground and one above ground.

Actual excavation began in the summer of 1948 when two tunnels were sunk at an incline of about 1 in 12 down into the hillside at Scaler's Hill, Cobham. After only eight days the seam of lignite was 3ft 6in thick and increasing in depth and quality. By August 6th 1948 the Managing Director, Leon Franchel, reported that at 30ft into the hillside the lignite was turning into bituminous coal. A week later the seam was 4ft thick and the miners were 'turning to the right to connect up with the second tunnel to make an airway' When this heading was completed it exposed 'about 15yds of coal bearing face at least 3-4ft thick'.

Around this time the company entered into an agreement with William Cory and Sons to sell the coal on a commission basis. They were also to act as an agent for any other minerals produced. The coal/lignite was sold locally but was not that successful as it only burnt well in certain fires and was 'very crumbly'. Apparently a sample of 5 tons was sold to Meux's Brewery at 50shillings a ton but there was no follow up order.

Despite rather poor sales and output the owners of the company were obviously still confident of achieving great things as in July 1949 they applied for planning permission for the erection of removable huts for use as engine room, miner's rest room, and office. Permission was granted until 31.7.1951 by Strood Rural District Council with the following conditions:

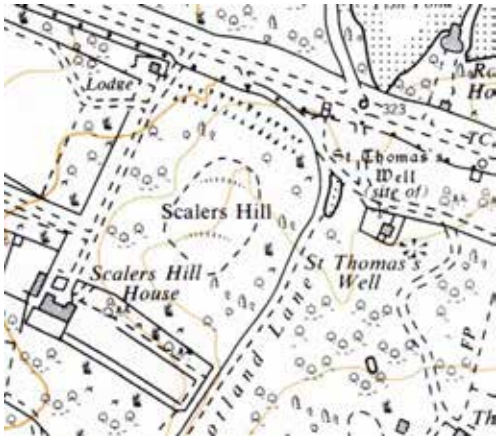
a) That the activities be carried out without injuries to the amenities of the locality by reason of noise, smoke, smell, fumes or vibration.

b) That the buildings shall be painted and maintained an approved shade of green.

The grounds given for temporary consent were that permanent development would be contrary to and prejudicial to local amenities.

The 6 ft high buildings were to have a 6 in concrete base and be made of corrugated iron on a steel frame bolted to the base, with windows and doors for ventilation.

As the galleries deepened the lignite/coal seam increased to 6ft thick and better tonnage rates were achieved. As the mine was driven into the relatively loose Woolwich and Reading Beds, the tunnels were very unstable and prone to collapse and so had to be heavily timbered. Small collapses were a frequent nuisance but a more serious collapse blocked the western tunnel at the junction of the cross gallery. It was decided not to clear this unstable area but to develop the eastern tunnel which was driven further under Scaler's Hill.



1960 1:2,500 OS map of Scalers Hill. The gully where the adits were located is clearly visible but there is no evidence of any mine workings

Water was a major problem to the miners as it flooded the workings and contributed to falls. It was kept under some control by draining a specially dug sump with a petrol driven pump. There was a proposal to dig a drainage tunnel from the sump to a point lower down the hill but there is no evidence that this was ever excavated.

Visit by London Speleological Group

At some point in time around 1950 two cavers of the newly formed London Speleological Group were shown around the workings by Manager Tom Wallis. They wrote of their experience in the first volume of the LSG's 'Records' published in 1956 and it is worth quoting part of their report as it gives an eye witness account of the operation.

"There are two drifts driven at right angles to the gulley. The west drift has been blocked by a fall but the other – the life line of the workings – is intact. This particular gallery extends for a distance of 55yds and has three working faces leading from it. The dip of the workings is 1:12. With a seam 6ft thick no difficulty is experienced in working. At present black lignite is being mined which resembles poor quality bituminous coal but some good bituminous coal has been found and larger strikes are expected soon. The overburden at the face is 60ft. Haulage is by tubs, one at a time, running on a single tramway and hauled by a diesel winch. Illumination is with acetylene lamps and all working is done by hand. Difficulty is being experienced with water which besides flooding the workings causes minor roof falls, made more likely by the fact that the roof is of 'shaly' Woolwich and Reading Beds. However, the water is being kept under control with a petrol driven pump. With a working strength of five men, three at the face and two at the bank, the output per man per shift is 5½ tons – 80 tons a week. The tonnage of coal has yet to be proved but it is known that the seam extends 300yds to the east and a further seam of lignite of unknown thickness is believed to exist 60ft below the present workings. It is proposed to drive an adit from the lower end of the gully to the sump in the mine and so drain off the water. If the present labour force can be increased an output of 150 tons a week is anticipated."

In November 1951, Lesley Dale, an amateur geologist and archaeologist with an interest in underground sites, paid a visit to the site and was also taken around the mine galleries by the enthusiastic Manager who gave him various pieces of lignite for his mineral collection. He also gave Les a photograph of miners working in the eastern gallery taken around about two years earlier and shows the heavy timbering of the tunnel and three (obviously posed) miners. Les was told this photo had been taken for publicity purposes and had been given to the local press shortly after the mine had started.

Unstable ground and methane prevent expansion of the mine

The company's plans for the future were thwarted when further problems occurred. As the eastern gallery penetrated further under the hill marsh gas (methane) was encountered which posed several logistical problems. Firstly the naked flame acetylene lamps used by the miners could not be used in the explosive atmosphere so they would have had to switch to special gas proof electric headlamps. Secondly some form of forced ventilation would have to be installed to bring fresh air to the working faces. There had been an intention before the gas was found to drive another tunnel into the hill to meet up with one of the eastern working faces so as to improve ventilation and to provide a second entrance. This would have helped the situation but would not have been sufficient to fully deal with the methane danger.

By now Messrs Cory and Sons had realised that the venture was doomed to failure and decided to pull out. This was the final kiss of death for the mine and the Cobham (Kent) Mining Company was wound up in 1953.

The mine is abandoned in 1953

Lesley Dale re-visited the site around 1954/55 when all the sheds etc had been removed and managed to squeeze past the wooden door sealing the eastern tunnel entrance. He found that there had been extensive roof falls since the mine had been abandoned and he could not penetrate far as the water level was too high and the condition of what was left of the roof was far too dangerous.

A recent LiDAR scan of Scalers Hill shows it is riddled with collapsed ground. LiDAR digitally removes vegetation from aerial photos to reveal the actual surface of the ground

Today the area is very different – the A2 is now a six lane highway and the construction of the extra carriageways has obliterated the site of the office and huts. The former entrances to the mine have long since fallen in and are no longer visible. On the wooded hillside overlooking the road, however, two lines of depressions mark the site of the mined galleries. The timber props would have failed shortly after abandonment and the resulting roof failures have worked their way to the surface.

During the last of the road widening a few years ago the lignite seam was briefly visible in the cutting until it was obliterated with concrete.

One of the collapsed adits to Scalers Hill mine c.early 1980s

One of many overgrown crown holes above the collapsed galleries below

North and South Sutor Batteries, and Fearn airfield

Barrie Eden

Fearn Operations Block

Following on from the 2022 Scottish Sub Brit visit to Inchindown and Invergordon tanks, a number of the group continued to Fearn Airfield, with the objective of visiting the operations block. Fearn was a satellite to Tain, an RAF field constructed in 1941. Sparsely used, it was transferred to the navy in 1942. Under the new designation of HMS Owl, torpedo and radar training took place flying, Barracudas, Swordfish and Ansons.

By 1946 the field was transferred back to the RAF, who utilised it as a relief landing ground and for storage. Closed in 1957, the airfield covers a large area, and retains a surprising number of buildings – nissen huts, crew shelters, hangers - in differing conditions, some in industrial & agricultural use and others derelict. However, the future of aviation use on part of the site appears secure, with the so named Easter Airfield in use for light aircraft.

Interior of the Fearn operations block

The operations block is a substantial building protected by earth bunds with interior partitions remaining, though containing few fixtures other than what appeared to be an original stove. We were able to meet the owner, who was undoubtedly enthusiastic and committed to preserving, securing & renovating the building. It was good to see that the first two objectives have been achieved. However, extensive works will be required if a wish to utilise the building for residential purposes is to be achieved. He intimated that he would consider offers - anybody has a spare £100k!

The former RAF control tower, the most substantial remaining building, has been completely renovated, and is available in part as holiday accommodation. It is worth noting that this building featured in the Channel 4 programme "Restoration Man" – watch on YouTube.

North Sutor coastal battery

The North & South Sutor batteries were an important component of a national defensive system that extended from Shetland to Cornwall, 50 of such batteries being constructed in Scotland during the First and a further 70 during the Second World Wars. Whilst important anchorages such as Rosyth and Scapa Flow had a large number of defences, it was considered that two batteries were sufficient to protect the mouth of Cromarty Firth.

The extensive survival of elements from both wars make this a particularly interesting & fairly rare example of coastal batteries, this being recognised by their scheduling as ancient monuments in 2019. The site contains the remains of four artillery batteries with associated magazines, accommodation & administration blocks and ancillary structures. It is interesting to note that the site was constructed by the navy rather than army, resulting in a different design of structures.

The major features on the site are two concrete emplacements containing 6 inch guns, MK V11 on MK V mountings. These were built in 1940 adjacent to earlier structures that contained 9.2 inch guns, originally ship mounted. It involved the removal of most the above ground structures associated with the earlier guns, although the original magazines were adapted and reused. In 1942 the original guns were replaced MK X1V, these remaining in place until 1956, when the site was placed on a care and maintenance basis.

North Sutor 6" gun emplacement

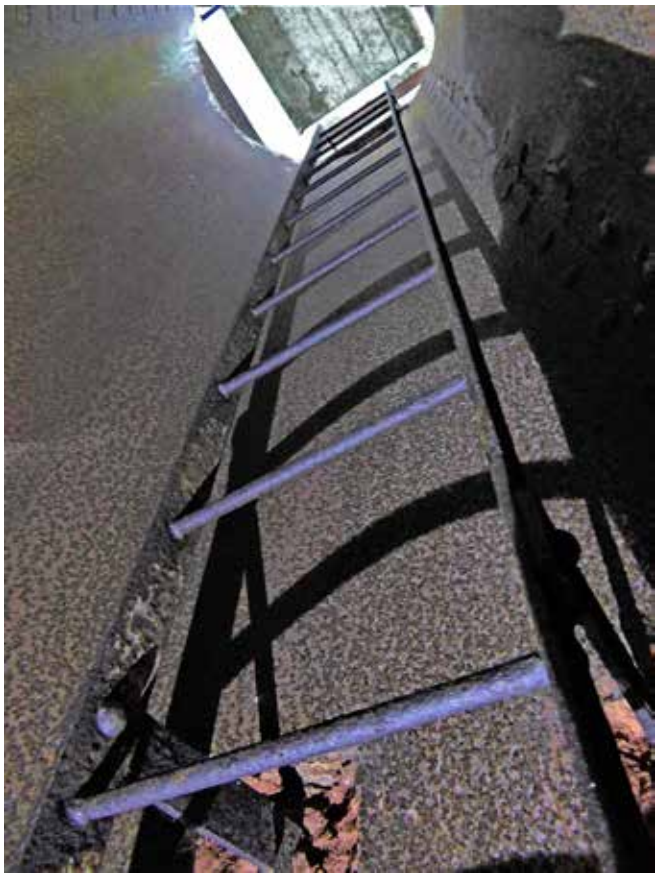
North Sutor camouflaged office block

North Sutor emplacement with boulder camouflage

Camouflage paint is still visible within the emplacements, and it was particularly interesting to note small boulders placed on the front apron in an attempt to disguise the

structures. (photo 5) Access to the magazine serving one gun was still possible, either by means of a sloping ramp or a former ammunition shaft that had been converted to a means of escape. The latter was located within the remains of one of the 9.2 emplacements. Entrance was still possible down a vertical ladder leading into blackness, which of course most of the Sub Brit members present decided to climb down! The interior was remarkably well preserved, including elements of the shifting chamber.

North Sutor Magazine emergency access



Interior North Sutor Magazine emergency exit

Remaining buildings on the site include an engine house, crew shelters, observation and radar buildings, and a searchlight platform, with camouflage paint still visible on a number of them. Four QF guns were installed in the First World War but were removed thereafter.

Concrete pads apparently once contained a First World War rocket installation for anti-aircraft defence.

Traces of camouflage on North Sutor engine room

Landward defence was provided by a trench system and a perimeter fence, several lengths of which still exist. Of particular interest were two structures resembling pillboxes but without rear walls.

North Sutor half pillbox

The view across the Firth from the battery towards South Sutor is superb, but regrettably time did not permit a visit. It is understood that the site is in a similar, if not better, condition, though that access to it is not encouraged by the owner. The presence of wild boar within the security fence is probably sufficient to discourage trespass!

North Sutor view to rigs at Nigg

This proved to be an excellent visit and thanks should be extended to our hosts for guiding us.

All photographs by the author.

The tunnel collapse at Penmanshiel, Scottish Borders

Jim Summers

A1 Pacific No4475 bursts out of Penmanshiel Tunnel with 'The Flying Scotsman' in 1931. Photo Frank Spaven collection

On a cold, dark night in 1979, when rail and road travel in the northeast of England had already become severely dislocated by blockages from heavy snowfalls, the railway tunnel at Penmanshiel collapsed

Dating back to 1846, the 264 yard (244 m) Penmanshiel tunnel lay north of Berwick and 39 miles south of Edinburgh, and was a vital part of the East Coast Main Line (ECML) from London King's Cross to Edinburgh. Built as a single bore, but for double track, it lay on a curve, which restricted speed to 60 mph. Then, at 0345hrs on Saturday 17 March 1979 the roof fell in.

Getting ready for the Advanced Passenger Train

Work had been going on in the tunnel since January to lower the floor in order to permit trains to carry intermodal containers 8 ft 6 ins high. Clearances for the faster speeds of the tilting Advanced Passenger Train and for electrification were also being borne in mind. In 1979 however, the tunnel works had a symbolic significance for the Scottish Region of British Railways.

Along with the track renewals and uplifts of speed for the impending 125 mph HST trains, the works were evidence of the end of the limbo of postponed maintenance to which the Beeching era had condemned the Newcastle – Edinburgh section.

In the summer timetable from May of that year the interim HST services were due to burst into flower with a comprehensive, frequent, accelerated pattern of services. These in turn would enable the existing main line rolling stock to be cascaded to enhance the quality of services elsewhere.

Strategic implications

The collapse of the tunnel and enforced closure of the route therefore had far-reaching strategic implications across the UK. Where necessary, tunnels further south had already been enlarged, while maintaining the train service. This successful pattern was applied also to the work at Penmanshiel. The train movements had been meticulously planned and had settled down to a rhythm such that use of one line while the other was closed was hardly noticed by passengers.

At Penmanshiel, work on the track-lowering had been proceeding on schedule: the down line track had been lifted, and the rock floor below it was being excavated to a depth varying between 550 and 770mm. The up line was once more carrying traffic, having been lowered and secured on concrete paving. Paved track meant less excavation and was one of the measures taken to reduce the extent of the disturbance to the fabric of the tunnel.

The tunnel had been built with a brick arch, but this sprang from ledges cut in the rock of the tunnel sides about 1½ metres above track level. The thickness of the brick arch tapered down to this ledge. Consequently, it was imperative not to weaken the rock supporting the arch during the lowering of the floor, and therefore, no undercutting was allowed, and the use of explosives was prohibited.

One of the first batch of the new High Speed Trains emerges from the south end of the tunnel on 15 March 1979, two days before the tunnel collapse. The engineers are completing the up line, and traffic in both directions is being worked over the as yet unlowered down line. Photo Frank Spaven

The collapse begins slowly

By the night of 16/17 March the down trackbed had been successfully lowered, preparatory to laying the concrete. As a JCB excavator and a dump truck were finally tidying up the surface, the supervisor noticed small pieces of rock bursting from the vertical face of the rock on the down side. Shoring timbers were kept available, but as he set off southwards to organise their precautionary use, the roof suddenly fell in behind him. It filled the tunnel over a stretch of 35 metres, burying the vehicles, together with the two drivers.

The Mines Rescue Team, together with specialist contractors, could only use hand tools to try to reach the bodies and were in extreme danger, as the rockfalls persisted. Ribbing was installed from the Edinburgh end, which was approximately 184 metres from the fall. Eventually the JCB became visible, but attempts to recover the two drivers, aged 20 and 33, had to be abandoned, such was the risk.

The scene which ultimately defeated the Mines Rescue team. Photo British Rail

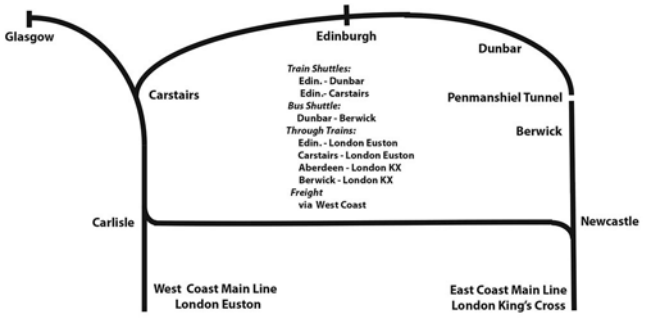
Diversions are necessary

In accordance with established railway contingency plans, it fell to the Control Offices to arrange the immediate diversion of the trains already on the move towards the obstructed part of the ECML.

On this occasion, those Control Offices involved, at Newcastle, Carlisle and Edinburgh, had at first little scope for solutions other than ad hoc diversions of down overnight trains via Carlisle, and these were already hours adrift due to the snowstorms. Cancellations and ad hoc bus services characterised the remainder of that day.

The Control Offices had to address the problem until long-term measures could be devised by the train planners. Purely on the basis of the radio breakfast news that Saturday morning, many of these had gone into work, sensing a crisis.

Their timetabling procedures would have to coordinate a complex, inter-acting network of people and equipment, and inform booking and enquiry staff. The full production cycle of a national timetable can take a year. The teams in York, Crewe and Glasgow devised comprehensive passenger, parcels and freight timetables together with resource plans of quality in two days or less.



Action in Crewe was decisive: the scrapping of eight electric locomotives was suspended, and their part of the country was scoured for long-distance coaching stock, while their West Coast timing graphs were mined for slots for new Anglo-Scottish train paths.

By Saturday afternoon, timetables to the normal half-minute were being exchanged with the Glasgow timing staff. Over on the fractured East Coast Main Line, a natural concern of the York planners was how to maintain

the integrity of its Newcastle–King's Cross timetable, which was dependent upon adequate numbers of HSTs.

Shuttle services

They fretted about the use of some on the shuttle services from Edinburgh to Dunbar, where passengers transferred to buses for Berwick, let alone on the few through trains which were to be diverted via Carlisle and across to Newcastle: this saved passengers the inconvenience of changing to shuttle buses between Dunbar and Berwick, but was time-consuming.

The power of the HSTs was necessary if these diverted East Coast trains were to share the West Coast Main Line, with its fast electric-powered services. The Scots did at least run the HSTs on one engine only when working the shuttle services, since this was a period when BR was required to play its part in the national drive to cut oil consumption.

The boarded up south portal of Penmanshiel Tunnel on 25 March, 1979, eight days after the tunnel collapsed. Photo DR Vickers

Extensive and complicated as the hitherto untried service inevitably was, the railway family made it work reasonably from the outset, though on the first Thursday, snow on the main A1 trunk road brought suspension of the substitute shuttle bus services.

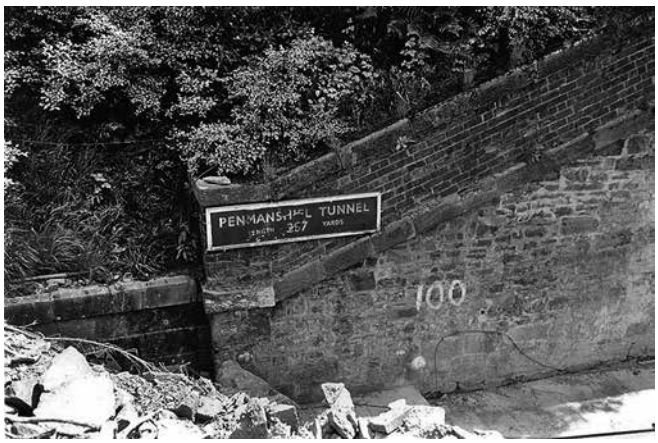
Having instituted a robust temporary service, the train planners in all three offices knew that, if the blockage were to be prolonged, they would be faced not only with refining their short-term emergency train plan. They would also have to rework their plans for Easter, for the Spring Bank Holiday, and for the summer 1979 timetable, upon which so many hopes for the full HST service had been pinned. This indeed proved to be the case.

Compared with timing the fixed formations of the passenger trains of today, train planning forty years ago still involved the ramifications of newspaper, letter and parcels mail, railway parcels, Motorail, overnight seating, sleepers, marshalling en route, and additional seasonal trains. The Easter timetable supplement had already gone too far in distribution to the public to be amended, yet it was apparent that it could not be fully honoured.

Revised timetable published

The summer timetable was well advanced in printing. Therefore a fully-reworked ECML timetable (for the first time featuring Euston!) was published as a *Revised Passenger Timetable* from 14 May "until further notice". A remarkable feature was that, apart from two gaps in the afternoon, an hourly service with London was now being offered.

It contained footnotes which promulgated changes due to be made in the course of October, normally the winter timetable period. It looked as if the train planners had inured themselves to a very lengthy period of diversions, but who could tell when – or if – the tunnel would be reopened?



The forlorn sign identifying the tunnel at the north end. The rocks in the foreground are part of the creation of the new diversionary line. Photo J. L. Stevenson

The bus operation round the blockage was centred on the Berwick garage (part of the Scottish Bus Group, though located in England). From the speedy emergency response of the first day to the routine efficiency of the spring and summer, it performed well, and working relationships were harmonious. Indeed afterwards, at a possibly unique occasion, bus and rail staff sat down together at a formal dinner and accepted gratitude and mementos from British Rail Scotland for a job well done. It had indeed demonstrated an integrated transport system in practice.

Reconstruction ruled out

Once the decision was made in April that reconstruction of the tunnel was not reasonably feasible, swift moves were necessary to devise a new alignment around it. Clearly, for speed of execution, it would be helpful if the new line were within the limits of deviation permitted for the original construction of the route in 1846.

BR located the US citizen who was the local land owner, flew him to Scotland and found him most cooperative. The enthusiastic Borders Council pushed a suitable planning application through in unprecedented time. In the event, the new tracks were carried through the hillside in an open cutting, adjacent to the abandoned tunnel, but at a level about four metres higher – saving cost and construction time.

The hillside has been cut away with two berms, and the new diversion takes shape with the A1 road alongside. The view is looking north. Photo J. L. Stevenson

The southern mouth of the abandoned tunnel, like the north portal, nowadays no longer to be found. Photo Bill Roberton

The new rail line nearly complete, showing the exposed rock face which helped to explain the roof fall. Lorries are on the temporarily diverted A1. Photo J. L. Stevenson

Co-operation was necessary too with the Scottish Office, whose London – Edinburgh A1 trunk road crossed over the ECML on the southern approach to the tunnel and would be cut by the new line, due to its new, higher elevation. The road itself was due for realignment. BR had in fact earlier opposed a scheme to re-route the road over the hill at Penmanshiel, because of risks to the tunnel. An eventual road scheme had already been agreed, but this could not be brought forward to the same timescale as the new railway, which needed to be excavated across the course of the existing A1.

The solution was an interim bridging of the proposed alignment, achieved by installing parallel Bailey bridges close to the old road bridge. The spirit of cooperation continued to be evident: the spoil from the railway excavations went to form the embankments of both the temporary and final diversions of the road.

All this harmony had its reward. Construction had started on 7 May, and the restoration of through train services was possible from 20 August 1979, six weeks earlier than envisaged.

New alignment seen from the north (1979). It shows a few features: a glimpse of the north tunnel mouth on the left, about to disappear for ever, and the temporary A1 (note the telephone poles). Photo Bill Roberton

Squadron service. A morale-boosting advertisement that the accelerated, frequent HST service was now possible. Photo British Rail

Inquiry begins

There remained also the Inquiry by Her Majesty's Railway Inspectorate, and the possibility of legal proceedings. Exploratory boreholes and laboratory tests confirmed the high strength of the brickwork. For the HMRI, Lt Col McNaughton commented that all concerned with the planning and execution were competent people and he considered "the work on site … to have been carried out with proper care and foresight." The mystery of why the tunnel collapsed therefore probably lay, inaccessibly, within it.

Evidence did eventually become available, in an unusual way. Because the deviation works sliced through the hill

in an open cut adjacent to, but higher than, the line of the tunnel, the rock was exposed. Geologists were able to pinpoint a complex anti-clinal structure, unknown elsewhere in the area, that ran across the line of the tunnel near the collapsed portion. This had apparently resulted in a wedge of vertical, broken rock becoming suspended in an unstable manner over the arch ring of the tunnel.

The Inspecting Officer noted that experts considered it most unlikely that this "extreme complexity of the geology" would have been uncovered by a full geological survey. It was known that a large void existed above the arch ring near the northern end, but the rock was supported there by a special series of brick walls with access to all points for inspection. Indeed this was the reason why BR had prevented the re-routing of the A1 over it. Lt Col McNaughton was satisfied that no individual could in any way be held responsible for the collapse.

The British Railways Board was, however, prosecuted and fined £10,000, largely because a survey could have been taken but was not. As the HMRI Inspector put it, a survey might have served as a good legal defence but, in his view, would not have prevented the collapse of the tunnel.

British Rail erected a cairn on top of the hill in memory of the two young men, Peter Fowler (20) and Gordon Turnbull (43) who lost their lives. Photo Richard Webb

Telling this tale to Sub Brit

A railway manager finds himself addressing a wide variety of audiences who, shall I say, have varying degrees of sympathy with the railway and all its works. Locations vary too, from crowded platforms with disgruntled commuters, to staff bothies with hardened front-line staff, to conference rooms with sharp civil servants.

But, for me, it was breaking completely new ground on a Sunday morning to face an audience clad in anoraks and mufflers in a gaunt, lofty box of concrete in Barnton Quarry, largely unknown to the denizens of Edinburgh and hopefully to the other side in the Cold War, in order to tell the story of the Penmanshiel collapse.

View northwest in March 2010 showing the old alignment of the A1 trunk road now cut by the rerouted East Coast Main Line crossing the centre of the picture. The present day A1 can be seen in the background and the western slope of the hill through which Penmanshiel Tunnel passed can be seen far right. Photo John Furnevel

Warm, however, was the welcome from the good folk of Subterranea Britannica; their questions were keener than usual, and I do believe we finished at what in the trade is called the Right Time. It was then a privilege to hear the other speakers, and to learn more of the programme and hugely wide interests and expertise of Sub Brit. May your signals all read "Proceed".

Chislehurst 'Caves' in 1923 **Paul Sowan**

At the rear of the Bickley Arms Hotel, in the cliff at the foot of Chislehurst Hill, is the entrance to Chislehurst Caves, one of the most interesting pre-historic artificial excavations in this country. They may be visited from the Hotel on payment of a small fee for [a] guide and lighting: a large portion of their extent is now lighted by electricity. Although many miles have been explored, their extreme limits have never yet been reached. The most ancient portion consists of a labyrinth of passages about twelve feet wide, of fine workmanship, containing many apsidal recesses with chalk altars. These are reached from the cliff by a broad, straight gallery, 150 feet long, 10 to 12 feet high, 12 to 15 feet wide, narrowing to 7 feet at the roof. From this, extending to right and left, are passages of like character, opening again into others, so numerous that the visitor is fairly bewildered and loses all idea of the direction in which he is travelling. There are many Dene-holes in the hill above, which, penetrating to the Galleries, afford ample ventilation. [Your scribe adds: The 'Chislehurst Caves', now with a modern visitor centre, café and gift shop, still operates at Caves Close, two or three minutes walk from Chislehurst Station. The 'caves' are in fact probably largely relatively modern chalk mines. They have been a minor tourist attraction on and off for about a century, and used also for explosives storage in World War I, mushroom culture, and an air-raid shelter in World War II] SOURCE: ANON, 1923, Kelly's Directory of Bromley, Bickley, Chislehurst & District 1923, page 251.

Stasi Bunker Museum, Machern, former GDR

Jana Bleyl – Citizens' Committee of Leipzig

Telephone exchange. Photo Nick Catford

The Citizens' Committee of Leipzig, a non-profit association, is the custodian of both the *Runde Ecke* Memorial Museum in Leipzig and the Stasi Bunker Museum in Machern. The former is home to an exhibition devoted to the Ministry of State Security, documenting its history, structure und methods of operation.

In August 1990 they opened the exhibition ***Stasi – Power and Banality*** in the authentic premises of a former district headquarters of the secret police of the former GDR. Since its opening it has become a significant and continuing contributor to the process of reappraisal of the past in Germany.

Emergency command centre

In Machern, 30 km east of Leipzig, is the former emergency command centre of the district Stasi commander. The bunker is the only almost completely preserved district level Stasi command centre. Here the

Personnel entrance to the Stasi Bunker, Machern. There are two such entrances in the warehouse building which hides them. Photo Dave Maguire

Citizens' Committee documents in a dedicated museum the military activity of the Stasi and its functions in the case of 'tension and mobilisation'.

Stasi District Headquarters, Leipzig. Photo Dave Maguire

Located in the Lübschützer Teiche recreational area, the entire command centre was camouflaged outwardly as a holiday complex belonging to a Leipzig water supply and sewage treatment company.

At the heart of the complex

At the heart of the complex is the bunker built between 1968 and 1972. In the event of 'tension' and the need for 'mobilisation' the Stasi commander, together with one hundred full-time employees and two KGB (Soviet secret service) liaison officers, would have moved his command centre from the district headquarters in Leipzig, the *Runde Ecke*, to Machern.

For this purpose, all communication connections to the Leipzig headquarters also went here. The emergency command centre was a secretly-created complex, designed to maintain the Stasi leadership's hold on power, even in exceptional circumstances.

The bunker was discovered only towards the end of 1989; before that it was largely unknown to the public. After a long effort the Citizens' Committee of Leipzig succeeded in being awarded a 99-year lease over a substantial portion of the 5.2 hectares (12.84 acres) site from the county Wurzen, in order to preserve this testimony from the past from destruction by development.

In 1995, the entire area was classified as a historic monument. On the Heritage Open Day of 1996, the bunker was opened for the first time since 1991.

Historic monument

All the preserved buildings and installations, including the complete interior of the bunker, are open to visitors. The guided tours demonstrate, among other things, how the supply systems worked, how news contacts were produced throughout the GDR and what survival strategies the Stasi developed for a nuclear strike. An exhibition shows mobilisation plans in the district of Leipzig and the involvement of the emergency command centre in these plans.

The history of the Stasi

The dreaded Ministry of State Security was founded on 8 February 1950. It was a secret police force that fought opponents of the system within *and* outside the borders of the GDR. Within East Germany itself the Stasi had in 1989 about 91,000 full-time members. In addition there were 175,000 unofficial collaborators.

The GDR was subdivided into fifteen districts. The district administration of the Ministry of State Security for the district of Leipzig was placed in a building called *Runde Ecke* (round corner) where 700 full-time members worked. In the demonstrations of 1989 that witnessed the collapse of the Berlin Wall, citizens of Leipzig occupied the Stasi's district headquarters in the *Runde Ecke* on the evening of 4 December.

Preventative detention

The uprising of 17 June 1953 led to the restructuring of the Ministry of State Security. From 1960 onwards plans for mobilisation were made. To prepare the Stasi for a military conflict, directive 1/67 was issued in 1967, when Erich Mielke, Minister of State Security, laid down details for the case of crisis. The document contained all plans for mobilization, including taking people into custody in detention camps or isolation camps. Isolation was for people who were critical of the regime.

The other part of directive 1/67 dealt with the decentralisation of the various district headquarters. A bunker was built in each of the former districts of the GDR. The one in Machern was designed for the head of the district administration of the Stasi in the district of Leipzig and one hundred Stasi members. In these plans for all divisions of the district of Leipzig, alternative locations such as restaurants, shopping markets and other buildings were listed for Stasi occupation.

The bunker

The Ministry set out guidelines for the distance from the city centre, ownership structure, geographic conditions, attention to ground water, and that there should be a forest to use as a screen.

The bunker complex was well equipped, with a house for the commander, workshops and facilities for guard dogs. The commander's house was meant to suggest the site was a civilian one, but the owners of the gardens and weekend houses next door saw the fences being put up and construction going on. Many believed that

Receiving antenna hidden in the tree branches. Photo Dave Maguire

The commander's house replicates a holiday apartment. Photo John Coates

Guard dog kennel with catenary wire for lead. There was a guard dog run on both sides of the entrance/warehouse building. Photo Dave Maguire

the military was using the ground. Stasi members kept almost the entire weekend house site under surveillance.

Sliding block for lead. Photo Dave Maguire

Security zones

Apart from the underground bunker the complex consists of a 5.2-hectare (12.84 acres) surface area with several buildings and facilities. The terrain is divided on the surface into two security zones. The inner Zone I was the restricted zone, which only Stasi members were allowed to enter. Bungalows were used to disguise the layout, which was officially a holiday camp for employees of Leipzig's 'people-owned company for water supply and sewage treatment'.

The bunker had an outside branch 3 km away, where the radio tower was placed to prevent the bunker being recognised because of its radio mast. The radio tower could be operated by remote control from the bunker and was disguised as a holiday building.

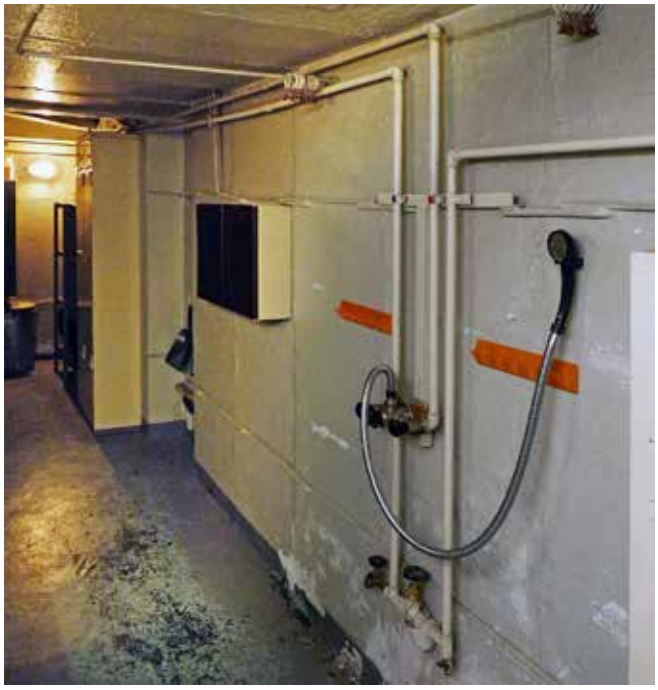
The bunker covers an area of 1,500 square metres and was built between 1969 and 1972. It became fully operational only in 1974. The foundations are five metres deep. The concrete roof is 50 cm thick and covered by 2.5 m of soil.

Site layout. Annotation by Dave Maguire. Background Google Earth

Decontamination zone

There were detailed orders how the bunker had to be entered through airlocks in case of emergency. The shower and plastic boxes on the entrance steps landing were used in the event of contamination by chemical or nuclear weapons: equipment and protective suits

were treated with chemicals for detoxification and decontamination. After the chemicals had been allowed to work, the radioactive dust and other agents were washed off using the shower.



Decontamination shower. Photo Dave Maguire

The preliminary airlock could be flooded with compressed air from air cylinders. This could flush out most of the contaminated air. Using a Geiger and chemical testing, the quality of the air could be analysed. The dosimeter evaluator would show how much radiation exposure someone had suffered under his protective clothing.

A decision was then taken in the preliminary airlock as to whether the individuals were to be allowed to enter the bunker or not. If they were, they had to remove their gas mask and their uniform at this stage and had to shower again. Some first-aid could also be done at this point. After that the Stasi officer left the 'neutral zone' and entered the main airlock.

Bunker entrance airlock. Photo Dave Maguire

In the main air lock, the 'clean zone', new clothing was available on racks for those entering, as well as protective clothing and gas masks for those leaving. The bunker could be constantly kept at overpressure to prevent contaminated air from entering.

The main airlock compensated for the pressure difference between the air inside and outside by means of air cylinders. This was checked via the inclined-tube pressure gauge. Once the pressure in the main airlock had been matched to that in the interior, permission could be given to enter the main bunker, the 'hermetically sealed zone'.

Detail of the display board schematic indicating sealed door and plant status. Photo Dave Maguire

The 'hermetically sealed zone'

This zone is a symmetrical building, each half having a main corridor and eight side corridors. In the right half were mainly offices, of the Leipzig Stasi commander, the chief of staff and the operations group. In the other half was the communication technology. Immediately inside, on the right side of this bunker, is the main control console with an outline diagram of the bunker.

From the main control console, the technical commander could control the technical systems, such as the airlocks, water treatment and emergency power. Small lamps showed the position of doors. The bunker commander was responsible only for the technical aspects. He, in turn, answered to the bunker command staff, which was led by the head of the Stasi regional headquarters, Lieutenant General Manfred Hummitzsch.

But the bunker was only used for practices without full personnel. In the event of war every man was assigned to a workplace and a bed. No Stasi member was allowed to move freely around the bunker: the doors at the ends of the corridors were to be kept closed; a courier service would pass on incoming news. That way it was assured that even the co-workers would not get more information than necessary.

Main corridor indicating doors branching off to the right. This corridor and narrow workshops is mirrored on the blast wall to the left. Photo Dave Maguire

From the main corridor on the right-hand side eight workspaces branch off which are 14 m long and 2 m wide. They are divided into areas for sleeping and for work. They had typical GDR furniture and office equipment, as well as different kinds of telephones for various functions. Field telephones made it possible to maintain communication when the normal ones didn't work. There was a fall-back option for all essential functions of the bunker, such as power and water supply.

Narrow workspaces. Photo Dave Maguire

One corridor had at its far end the section for classified documents. Forward of it was a sleeping area and space for the interpreter and office facilities. Another workplace also had space set aside for the two KGB liaison officers.

One corridor was for officers responsible for materials and personnel planning, signals and encryption officers, chemical officers, supply officer, and head of rear area services, while another one was a dormitory for 24 people with three-high bunk beds. Corridors were designated for officers, for special and military-operational questions, for officers working on analysis and information or general duties, and for two duty operations officers.

Sleeping quarters. Photo John Coates

In front of the commander's corridor was the workspace for the chief of staff and the operations group. Both corridors were clearly more comfortable than the others. In the commander's corridor his secretary sat up front, next to his or her personal assistant. The second section was intended for two deputies (Operations).

The commander's own room was in the rear and on his desk he had three telephones. One of them had the GDR-emblem on it: this was the direct link to Erich Mielke, the head of Stasi ministry in Berlin, using the special communication network of the government.

Washing facilities. Photo John Coates

Sanitation

There are sanitary facilities with three toilets and three sinks on both sides of the bunker. They had to be enough for around one hundred staff. This proves that the bunker was not built as a shelter for senior leaders and maybe their families. It was meant to be a strategic alternative headquarters from which readiness for action could be

ensured and the claim to power maintained. There were emergency exits located at the end of each toilet corridor.

Rescue and recovery

There was a workshop for all kinds of repairs in which tools, materials and also equipment for rescue were stored. The Stasi called this area *Rescue and Recovery*, hence the welding torches and cutting equipment. The workshop corridor also contains equipment for monitoring the microclimate in the bunker – temperature and humidity recorders and pressure recorders.

One can have a closer look at bunks and plastic sealing devices here. It's a good place to explain the air treatment and heating systems. The bunker was heated with warm air and railway radiators, as they were common in the GDR. This method needed a lot of energy. The running costs must have been enormous, especially since the temperature was constantly kept at 20° C according to the climate records in the Stasi files.

Ventilation plant room from the inside looking toward the filters. Photo John Coates

In the corridors with the fan system one of the three operating modes for the whole bunker could be selected: Mode I – Maintenance and repair (outside air used for ventilation purposes); Mode II – Filtration plant in operation (outside air brought into the bunker via the filters, low air pressure); Mode III – Hermetically sealed (outside air no longer used, high air pressure, all doors closed).

Fresh air could be drawn in here directly from the air intake shaft or via a gravel-bed shockwave suppressor (a set of vertical concrete rings with an in-built 'plug' of special gravel or stones that reduced the effects of any shockwave). Air could be cleaned to a certain extent by dust filters.

Depending on the degree of contamination outside, various additional filters could be switched on and off. When it became necessary to change a filter block, the filtration system would have been switched to another unit. When the bunker was hermetically sealed, the last part of the ventilation corridor could be closed and fresh air circulated through the building by a ventilation system.

Emergency 'bicycle' ventilation plant. Photo John Coates

In the event of a power failure, they could switch from the main fan system to the emergency system, which needed less energy, or even to the exercise bike, which was run by human power. Twelve to 15 volts was enough to operate a small ventilation wheel to let air circulate in the building.

Yellow containers present in all workplaces indicate the air conditioning units. When the oxygen content in the bunker air became too low, plates were taken out of the boxes and placed inside the yellow containers, which resulted in the carbon of the carbon dioxide being bound and oxygen being released.

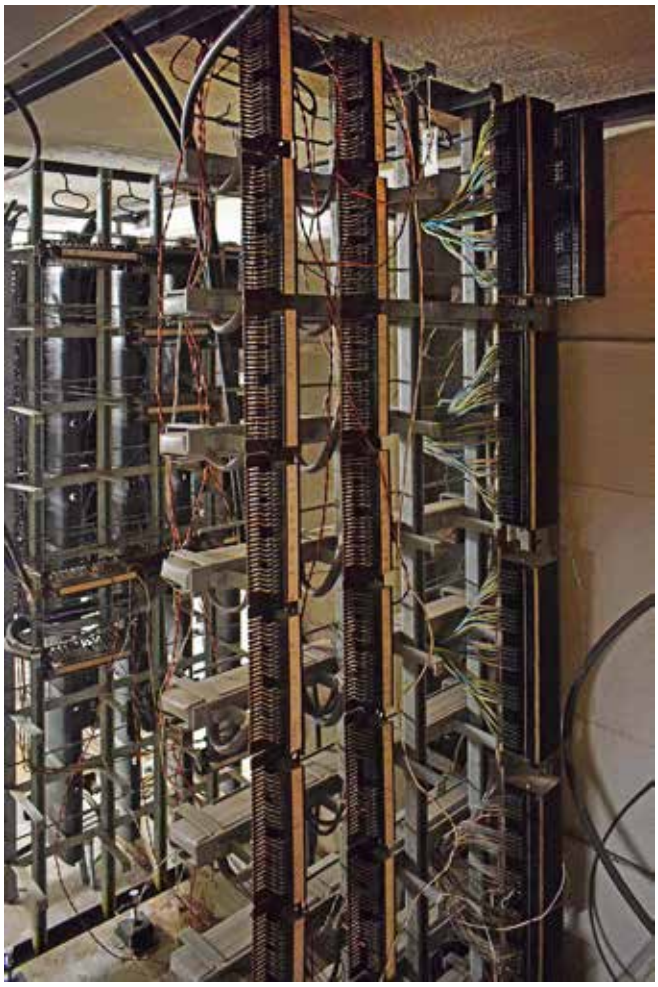
Water booster set and buffer vessel. Photo Dave Maguire

Deep wells

The bunker was not connected to the normal water supply: its water came exclusively from two deep wells with a depth of up to 50 m. They were brought into operation when the bunker was built. Water for the bunker, the house by the main entrance, the bungalows and the surface restrooms was provided by a booster system.

Original hand-written identifying labels are still seen attached to cables

In the sector for water supply is a boiler for reprocessing warm water and a filter to assure drinking water. Contaminated water was made potable by the water filter station, using chemicals and the condensation principle. In addition, a reserve tank held 3,000 litres of drinking water.



Communications rack. Photo John Coates

The bunker was built to be a military headquarters, where information about the situation in the crisis area was gathered, military decisions were made and from where the divisions of the Ministry of State Security could receive their orders. In order to direct the whole Stasi in this area from underground the bunker was equipped with some of the best communications equipment of the time.

Communications equipment

The telecommunications centre was designed with transmission equipment, teleprinter and telephone exchange. The rear part was secured by a grille, as there the teleprinters and the encryption centre were installed. One corridor houses the field telephone exchange.

In the rear part was the 'secret government exchange'. Another corridor for communications comprises the radio room. The transmitter, about three km away, could be operated from there. So, the bunker could not be discovered through radio signals.

Office of the Head of Secret Service District Administration. Photo John Coates

For the medical section two doctors and three ambulance men were included in the plan. Adjacent is the canteen and break room, which follows the kitchen with a serving hatch in the door. Food wasn't routinely stored in the bunker and would have to have been brought from Leipzig if the bunker were to be occupied.

Kitchen. Photo John Coates

Generator. Photo John Coates

The cupboards in one main corridor were the armoury of the bunker. Every full-time member of the Stasi had received military training, and in an emergency carried weapons with them.

With four standby generators – diesel engines – the bunker could be supplied in case of a breakdown of the electricity supply. They would have been fully available within ten seconds.

Above the generators are thick layers of gravel. They would absorb the shock waves and in the space between the stones they would provide the oxygen the engines needed to work. Behind the airing corridors of the generators were tanks for about 6,000 litres of diesel oil, which would have been sufficient for 25 days' continuous operation of all the generators.

Further information

Guided tours of the bunker are available.

Official website (in English):
www.runde-ecke-leipzig.de/index.php?id=253&L=1

The Machern bunker was previously visited by members of Subterranea Britannica on 25 May 2008.

Philip Lindhurst 1955 - 2023

Martin Dixon

Many members were saddened to hear of Philip Lindhurst's death on 26 March 2023. Philip was larger than life in both character and frame and a much-loved member of Subterranea Britannica for many years. He was best known for his 'behind the scenes' tours of disused London Underground Stations and for his loyal support for Paddock Open Days.

Philip Leonard Lindhurst was born on 19 December 1955 to proud parents Mary and Len. He was an only child and grew up in St Ann's Road Tottenham. For many years he believed he had many brothers and sisters as the house was shared with his eight cousins with whom he often played at the local recreation ground. His father Len worked at Liverpool Street Station, providing a link to Philip's own long career at London Underground.

Philip's first employment was washing cars as a teenager and he would invest his earnings in records - his love of music continued throughout his life. Later he had a Saturday job assisting on a milk float and one of the perks of the job was to go back to the milkman's house for tea and cake. This laid the seeds of a lifetime thirst for tea and love of cake - especially a Belgian Bun.

He embarked on his long career with London Underground at the age of sixteen in 1971. He trained as a Signal Operator and in early years worked at Cockfosters, Leytonstone and Aldgate Signal Boxes. For most of his working life, however, he worked at Cobourg Street Signalling Control Room near Euston. This controlled

train movements across the Northern and Victoria Lines.

Philip was proud of his job and well known amongst his colleagues for his professionalism, helpfulness, sense of humour and love of tea. In 1997 he received an award for quick thinking that prevented a derailment or worse on the Victoria Line. He never took life too seriously and was apt to ask new recruits what the running time was from High Barnet to Morden. 'About 1 hour 15 minutes'

was the usual reply but Philip would say ‘no - it’s about 10 seconds and would run along the length of the track diagram for the entire line!

Philip had a partner Wendy who sadly pre-deceased him and they lived together in Peterborough and Welwyn Garden City before settling in Cheshunt. They made great friends amongst neighbours and loved entertaining, especially on Sundays. Philip and Wendy travelled extensively, including to Bali, Cuba and Goa.

Philip used his London Transport knowledge and contacts to the full and is arguably best known in Sub Brit for the amazing trips he arranged. After joining Sub Brit he arranged a number of trips from 2008 onwards; as an example, the first trip covered disused parts of Euston, City Road, South Kentish Town, Charing Cross and Embankment. As you might imagine, that day’s visits lasted from 1000 to 1900. To quote Phil ‘If you don’t ask, you don’t get.’

Philip at Highgate station during one of his many excursions to closed London underground stations

Philip with Sub Brit committee members Richard West (left) and Bob Templeman

Philip’s trips continued for a number of years, always with permission from the local manager but without involving higher management. The invitation emails often read like a text message with minimal punctuation and random CapiTals but his big heart was what most people will remember. All went well until a visit to Aldwych when an alarm was triggered and British Transport Police were sent to investigate. The ‘powers that be’ decreed that the trips must cease and no one regretted this more than Philip himself.

Philip with the guides at Chernobyl

Philip was a frequent attendee on other trips and even when his mobility was limited would come along for the social side even if he had to sit out some of the visit. He had particularly fond memories of visiting Chernobyl with Sub Brit colleagues. He also loved helping out at Paddock Open Days, often managing things on the surface such as checking people in and selling publications.

Philip took early retirement due to ill health in 2014. When Wendy passed away in September 2018 this was a very difficult time for Philip but he got massively involved in sports photography, becoming the official photographer for Redbridge Football Club and Peterborough Ladies Rugby Club. He rarely missed a game and dedicated every Saturday and Sunday travelling miles to capture the action which he then posted on the Clubs' websites. In the summer months he enjoyed travelling on steam railways and enjoying 1940s music.

Philip's other passion was football.
Here he is at Redbridge FC catching the action

Philip suffered a heart attack on the way home from photographing a football game in Kent but was able to pull over and avoid causing an accident. Philip's funeral in Enfield was well-attended by colleagues from London Transport, Players and Officials from Redbridge and Peterborough and of course Sub Brit members.

I'll remember his warm heart, his easy conversation and his sense of humour.

With thanks to Philip's close friend Lisa Coomes for details of Philip's early life.

Some Tributes paid by Sub Brit members

His gruff laugh and wicked humour will be missed. He made me memories to last. Trackside in the dark waiting for an underground train to thunder through. Grimy we got, but oh so happy! Thank you Philip. Sue Monsell

Very sad news. I first met him on one of the Chernobyl trips in 2010. He was such a great person to talk to and will be sadly missed. Mike Cox

Phil had an amazing ability to get access to London Underground locations. I worked for LU and only saw stuff via Phil's visits. RIP Phil. Paul Naylor

Very sad news, he could always be relied on to assist at Paddock. Bob Templeman

Philip was a larger than life person (literally) who was a very regular helper at Paddock but will be best remembered by many members for arranging visits to closed tube stations. There were many stations I would never have visited without him. Nick Catford

Terrible sad news. Phil was a true gent. I also had the pleasure of knowing him through London Underground. I knew him first through Sub Brit and them found out he worked for LU. Had great fun sneaking up on him in the control room where he worked. Roy Kenneth

I met him many times at Paddock. He always had a smile and a joke. Will be sadly missed. Duncan Hawkins

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